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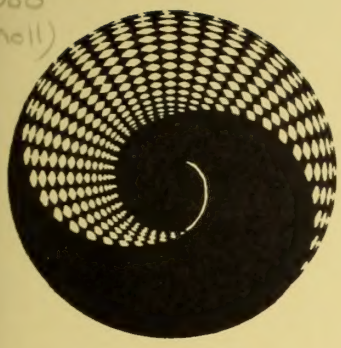

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The "*Oliva miniacea* complex", with the description of a familiar, unnamed species (Studies on Olividae. 25).

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KEYWORDS: Mollusca, Gastropoda, Olividae, taxonomy, *Oliva*, *miniacea* , *concinna*, *mascarena* , new species, lectotype.

SUMMARY. The status of *Oliva miniacea* (Röding, 1798) and similar taxa is reviewed. *Oliva mascarena* n. sp., a familiar, hitherto unnamed Indian Ocean species, is described. A lectotype is selected for *O. concinna* Marrat, 1870. The taxonomic status of the names used for this group of species (and of names incorrectly associated with them) has been critically examined.

RESUME. Le statut de *Oliva miniacea* (Röding, 1798) et des taxa qui lui sont similaires a été revu. *Oliva mascarena* n.sp., une espèce familière de l'Océan Indien, jusqu' ici non nommée, est décrite. Un lectotype est désigné pour *O. concinna* Marrat, 1870. Le statut taxonomique des noms utilisés pour ce groupe d'espèces (et des noms qui leur ont été erronément associés) a fait l'objet d'un examen critique.

1. INTRODUCTION

1.1. The *O. miniacea* - *O. tremulina* problem.

The large, spectacular *Oliva miniacea* (Röding, 1798) is very common and widespread in the South West Pacific. It exists in an amazing variety of colours, patterns and shapes, and is one of the most protean shells in the genus *Oliva*, itself well known for its variability. Large size and a deep reddish orange aperture are the only two stable characters reported in the recent literature (ZEIGLER & PORRECA, 1969; PETUCH & SARGENT, 1986).

The closely related *Oliva tremulina* Lamarck, 1811, common in the Indian Ocean, has been a controversial taxon for over a century. *O. tremulina* and *O. erythrostoma* Lamarck, 1811 (the name formerly used for *O. miniacea*) were considered as distinct species by WEINKAUFF (1878) and by DAUTZENBERG (1927). In contrast, JOHNSON (1928) considered *O. tremulina* as being a variety of *O. erythrostoma*. More recently, BURCH & BURCH (1967), comparing *O. tremulina* and *O. erythrostoma*, wrote "*O. tremulina* not only have a fleshy-white aperture, but seem to be less swollen at the posterior or shoulder of the shells. They are otherwise close, but we think they are easily separable." ZEIGLER & PORRECA (1969) wrote of *O. tremulina*: "... it is identical in appearance with *O. miniacea*, differing only in that its aperture is fleshy white." PETUCH & SARGENT (1986) also note the difference of aperture colour, say that *O. tremulina* has a "white, yellowish-cream or creamy pink ground colour" (instead of "cream-yellow or yellow orange" for *O. miniacea*). They do not give any other reliable criterion for discriminating what they consider to be separate species.

1.2. Extension of the problem.

The problem is not confined to the names *miniacea* and *tremulina*. One could predict that the complexity of the biological puzzle, compounded with equivocal nomenclatural practices, would result in taxonomic chaos. This did indeed occur.

O. miniacea is described in the *Museum Boltenianum*, which was rediscovered only in the beginning of this century. So, many earlier citations of this species are under its former name: *O. erythrostoma* Lamarck, 1811. Then, for a period (around 1910-1920) and for reasons unknown to us, *O. miniacea* was called *O. sericea* (Röding, 1798) by American authors, while the true *O. sericea* was designated by its former name, *O. textilina* Lamarck, 1811.

Many distinct species were confused. For instance, *O. tremulina* and *O. erythrostoma* were considered by TRYON (1883) as being only varieties of *O. irisans* Lamarck 1811. Then JOHNSON (1910), reunited (possibly in despair) most of the valid large Indo-Pacific *Oliva* species (*O. miniacea*, *O. ponderosa*, *O. textilina*, *O. tremulina* and others) as varieties of his *O. sericea* ; Johnson (not Röding, 1798), 1910. Under his variety *zeilanica* Lamarck (a nomen dubium, see GREIFENEDER, DUCHAMPS & TURSCH, 1995), the author even created a new variety *fordi* - a variety of a variety!. This was not an isolated excess: HIGGINS (1919), amongst others, used names such as "*Oliva sericea miniacea*" and the "*Oliva sericea* (*tremulina-miniacea* group)".

In the genus *Oliva*, authors have been much more concerned with nomenclature than with biological data, so numerous other names (discussed in section 6: Systematics) have been used for these shells and their various forms.

1.3. Purpose.

The need for a revision will be evident to whoever has been lost in the nomenclatural labyrinth erected around these large, common Indo-Pacific *Oliva* species. These are still habitually confused, even in the best collections.

We had to examine not only the various forms of *O. miniacea* (Röding, 1798) and of *O. tremulina* Lamarck, 1811 but also the related taxa: *Oliva atalina* Duclos, 1835, *O. ponderosa* Duclos, 1840 and a familiar but unnamed *Oliva* from the Central Indian Ocean, described here under. For added safety in the delimitation of the "*O. miniacea* complex", small samples of the outgroups *O. concinna* Marrat, 1870 (considered as *O. tremulina* by BURCH & BURCH, 1960), *O. hirasei* Kira, 1959 and *O. sericea* (Röding, 1798) (considered as a variety of *miniacea* by JOHNSON, 1928) were also examined.

Classical, chronological review of scientific names (most with very vague, if any biological meaning, see section 6) is not the most operational method for solving such a complex problem. Following the general approach outlined in TURSCH, MISSA & BOUILLON (1992), we elected to start by seeking experimental evidence for the existence of separable groups. The next step was the ranking of these groups into species, subspecies and varieties. Nomenclatural decisions could then logically follow objective separation and ranking of taxa, instead of preceding (or simply skipping) these steps.

Abbreviations:

AMS: Australian Museum, Sydney.
AMNH: American Museum of Natural History, New York.
ANSP: Academy of Natural Sciences, Philadelphia.
BM(NH): The Natural History Museum, London.
IRSNB: Institut Royal des Sciences Naturelles de Belgique, Brussels.
MCM: Merseyside County Museum, Liverpool.
MNHN: Muséum National d'Histoire Naturelle, Paris.
USNM: National Museum of Natural History (Smithsonian Institution), Washington.

Throughout this text, the convenient device of a semicolon inserted between the specific name and the author [*X-us albus* ; Smith (not Brown)] is used to distinguish between a misidentification, which has no nomenclatural status, and a homonym [*X-us albus* Smith (not Brown)], which has (see MAYR & ASHLOCK 1991: 362).

2. MATERIAL EXAMINED

2.1. Type material examined.

Oliva atalina Duclos, 1835. 3 syntypes at MNHN.
Oliva azemula Duclos, 1840. 5 syntypes at MNHN.
Oliva berti Terzer, 1986. Paratypes 1 and 2 in Terzer collection, Genoa.
Oliva concinna Marrat, 1870. 2 syntypes at MCM.
Oliva cryptospira Ford, 1891. Holotype n° 15878 at ANSP.
Oliva fulva Marrat, 1871. Holotype at MCM.
Oliva fumosa Marrat, 1871. Holotype at MCM.
Oliva fumosa kremerorum Petuch & Sargent, 1986. Holotype n° 841460 at USNM. Paratype n° C153453 at AMS.
Oliva galeola Duclos, 1840. 3 syntypes at MNHN.
Oliva lamberti Jousseaume, 1884. 3 syntypes at MNHN.
Oliva magnifica Ducros de Saint Germain, 1857. 5 syntypes at MNHN.
Oliva nobilis Reeve, 1850. Type n° 1892.9.24.18 at BM(NH).
Oliva olympiadina Duclos, 1835. 4 syntypes at MNHN.
Oliva ponderosa Duclos, 1840. 9 syntypes at MNHN.
Oliva quersolina Duclos, 1835. 3 syntypes at MNHN.

Oliva sabulosa Marrat, 1868. 2 syntypes at MCM.
Oliva sericea albescens Johnson, 1915. Holotype n° 111753 at ANSP.
Oliva sericea fordi Johnson, 1910. Holotype n° 111612 at ANSP.
Oliva sericea marrati Johnson, 1910. 3 syntypes n° 111862 at ANSP.
Oliva sowerbyi Marrat, 1870. 2 syntypes at MCM.
Oliva stainforthi Reeve, 1850. 2 syntypes n° 1892.9.24.13-14 at BM(NH).
Oliva tenebrosa Marrat, 1870. Holotype at MCM.
Oliva tremulina flammeacolor Petuch & Sargent, 1986. Holotype n° 841458 at USNM. Paratype n° C153546 at AMS.
Oliva tremulina oldi Zeigler, 1969. Holotype n° 147750 at AMNH. Paratype n° C111456 at AMS.

2.2. Other material measured.

The number of specimens that could be completely measured in this study was severely limited by the availability of such large *Oliva* shells with an intact protoconch (the heavier an *Oliva* shell, the more likely it is that its protoconch will be broken). In addition to the measured material, listed here under, well over two thousand specimens (in museums as well as in private hands) have been visually inspected.

DG: indicates specimens from the Dietmar Greifeneder collection; BT: Bernard Tursch collection, JMO: Jean-Marc Ouin collection, JS: Jacques Senders collection, TV: Musée de l'Afrique Centrale collection (Tervueren, Belgium). "noloc." means: no accurate locality. All specimens have an intact protoconch, unless marked with (-). In many cases, some measurements could be obtained on partially damaged protoconchs. For the definition of the provisional phena, see § 3.3).

Oliva atalina Duclos, 1835. **CARGADOS CARAJOS**: DG-3055/1 (-), DG-3055/2 (-), DG-3055/3 (-), DG-3055/4 (-), DG-3055/5 (-), DG-5639/1 (-), DG-5639/2 (-), DG-6181/1 (-), DG-6181/2 (-), DG-6181/3 (-), DG-6181/4 (-), DG-6181/5 (-). **MAURITIUS**: DG-588 (-), DG-1046 (-), DG-2194 (-), DG-5895/1 (-), DG-5895/2 (-), DG-6180.

Oliva mascarena n. sp. (provisional phenon *MS*) **CHAGOS, Peros Banhos**: DG-3076. **MAURITIUS, Grand Bay**: DG-5976 (-). **Rivière Noire**: DG-3058/1 (-), DG-3058/2 (-), DG-5786 (-), DG-5977, DG-6179/1 (-), DG-6179/2, DG-7206 (-). **noloc.**: BT-4255, DG-3058/3 (-), DG-3058/4 (-), DG-3058/5 (-). **SEYCHELLES, Beau Vallon**: BT-4367 (-), BT-4368, BT-4369, BT-4370.

Oliva miniacea (Röding, 1798). **AUSTRALIA *Queensland, Langford Reef, Biesley Is.***: DG-2873/9, DG-2873/g, DG-2873/6, DG-2873/5, DG-2873/7. **CAROLINE Is., *Truk Lagoon***: DG-6129/19, DG-6129/15, DG-6129/4, BT-3669. **FIJI *Lau Group***: BT-5078, BT-5077, BT-5076, BT-5075, BT-5081. **GUAM, *Piti*** : BT-3661, DG-6923/2, ***Agat*** : DG-7979. **INDONESIA**, (provisional phenon *IN*) ***Flores, Larantuka***: BT-1993. ***Tanimbar Olilit Lama***: BT-0027. ***Bali, Kesuma Sari***: BT-0058, DG-2000, DG-2000-MS1, JS-230, JS-231, JS-232. **JAPAN, *Okinawa***: DG-6663/2, DG-6663/1, DG-6663/3, DG-3764/2. **MARSHALL, *Kwajalein Atoll***: DG-5400/1, DG-5400/3, BT-2791, BT-2785, BT-2786, DG-6041/2 (-). **NEW CALEDONIA, *Nouméa***: BT-2972, BT-2973, BT-2980, BT-3345, BT-3346 (recn. 2377). ***Undispensable Reef*** : DG-6923/1, DG-6923/2. **PAPUA NEW GUINEA, *Hansa Bay***: JMO-004, BT-0908, BT-6549. ***Rabaul***: BT-0056, BT-0057, DG-2892/b, DG-2892/c, DG-2892/e. **PHILIPPINES *noloc.***: BT-4586, BT-4587, BT-4585, BT-4588, BT-4986. **SAMOA (W)**: DG-898/a, DG-2447, DG-751/a, DG-896/6, DG-751/c. **SOLOMONS *Kieta, Loholo Beach***: DG-5440/3, DG-5440/5, DG-5440/1, DG-5440/2, DG-5440/4; ***Malaita***: DG-2535/10. **THAILAND, Phuket (Andaman Sea)** (provisional phenon *WT*): BT-0067, BT-4344, BT-4345, BT-4346. **Ko Chang (Gulf of Thailand)** (provisional phenon *ET*): BT-5459, BT-5460, BT-5461. **TONGA, *Hihifo I.***: BT-0025, BT-0026, ***Vava'u I.***: DG-7266/2. **VIETNAM, *Nha Trang***: BT-6930, BT-6931, BT-6929, BT-6929.

Oliva miniacea tremulina Lamarck, 1811. **INDIA, *Cuddalore***: (form *flammeacolor* Petuch & Sargent, 1986): DG-935/f, DG-1522/e, DG-1522/c, BT-0953. **MAURITIUS *Black River***: DG-3064, DG-5978/3, DG-5975, DG-6429, DG-5785. **MADAGASCAR *SW, noloc.***: DG-7468/1. ***noloc.***: BT-3322. ***Tuléar***: DG-7681/1, DG-7681/2, BT-4770. **MOZAMBIQUE, *Nacala***: DG-8018/1, DG-8018/2. ***Conducia***: DG-7689/3. **REUNION, *noloc.***: BT-4907. **SEYCHELLES, *Mahé***: BT-4371, TV-794065, TV-794063, TV-798210. ***Praslin***: TV-798700. **SRI LANKA, *Negombo*** (form *flammeacolor* Petuch & Sargent, 1986): BT-6222, BT-6220, BT-6225, BT-6221 BT-6224. **TANZANIA *Dar es Salaam, Fungu Yasin***: DG-7956.

Oliva ponderosa Duclos, 1840. **PERSIAN GULF (?), noloc**: BT-4900. **MALDIVES, Baros**: DG-2594/e (-). **Farakulufushi**: BT-

1953, BT-1955 (-). **Gan**: BT-1199 (-), BT-1200 (-), BT-2328 (-). **Malé**: BT-3373 (-), BT-6738 (-), BT-6739 (-), DG-5899/1 (-), DG-5899/5, DG-5899/7 (-).

2.3. Outgroups.

The following shells have been used for comparison:

Oliva caerulea (Röding, 1798). **INDONESIA, Bali**: BT-0451, BT-0452, BT-0454, BT-0455, BT-1987, **PAPUA NEW GUINEA, Hansa Bay, Awar** (dark form): BT-7124, BT-7126, BT-7127, BT-7129, BT-7130. **Hansa Bay, Laing Island** (light form): BT-0463, BT-0469, BT-7119, BT-7120, BT-7040.

Oliva concinna Marrat, 1870. **PAPUA NEW GUINEA, Hansa Bay**: BT-7095, BT-7096, BT-7097, BT-7098, BT-7099, BT-7101, BT-7103, BT-7104, BT-7111, BT-7112. **PHILIIPPINES, Luzon, Manilla Bay**: BT-4342. **SOLOMONS, Honiara**: BT-2440, BT-2441. **Guadalcanal, Marau Sound**: BT-4438. **VANUATU, Port Vila**: BT-4343.

Oliva hirasei Kira, 1959. **PHILIPPINES, Bohol, Panglao**: BT-6194, BT-6196. **Sulu Sea, noloc.**: BT-2184, BT-5021, BT-6202.

Oliva sericea (Röding, 1798). **INDONESIA, Bali**: BT-0011, BT-0013, BT-2012, BT-4046. **PAPUA NEW GUINEA, Hansa Bay**: BT-0011. **NEW CALEDONIA, East Coast, noloc.**: BT-3341.

3. METHODS.

This work uses the morphospecies approach, an indirect tool for deducing the existence of biological species. We have so far never observed sexual dimorphism in shells of this group. Neither have we observed significant allometry, with the exception (see TURSCH, GERMAIN & GREIFENEDER, 1986a) of very small juveniles, not considered here. So, at least for sympatric samples, the existence of reproductive barriers can be safely inferred from the observation of gaps in the distribution of shell characters (see § 3.2.2 for limitations).

We have used objective, morphometric characters. Colour patterns (the main classical descriptors) are indeed extremely variable in some of the species, and are very difficult to report accurately. They will be used only as secondary, additional characters.

3.1. Measurements.

3.1.1. The protoconch measurements NW, SPRO, MPRO, LPRO, RES5, PAT17, PAT18 and the teleoconch measurements PNW, H, L, LW, D, R, X, F, FG and SUT that are utilised in this work have been defined in detail by TURSCH & GERMAIN (1985, 1986, 1987). They have been repeatedly tested and demonstrated to be operational in the genus *Oliva* (see TURSCH, GERMAIN & GREIFENEDER, 1986a, 1986b; TURSCH & HUART, 1988; 1990; TURSCH, 1988, 1994; TURSCH & GREIFENEDER, 1989a, 1989b; TURSCH, MISSA & BOUILLON, 1992).

For a quick reminder, these measurements are sketched in Fig. 1. Two important measurements do not appear on this figure. NW is the number of nuclear whorls and PNW is the number of postnuclear whorls. Both are measured to 0.05 whorl.

3.1.2. *Oliva* shells are notoriously variable in size (TURSCH & GERMAIN, 1985) and furthermore we have no sure way of deciding if a shell is adult or not. Therefore, raw teleoconch measurements could simply discriminate large from small specimens. Shape factors are much more informative. Teleoconch measurements will thus always be used as indices (ratio of two linear measurements or ratio of a given linear measurement to PNW). On the contrary, protoconch measurements do not vary with the size of the shell and can be used as such.

3.2. Analysis methods.

These are essentially the same as in TURSCH, MISSA & BOUILLON (1992). Each specimen can be represented by a point in the attribute hyperspace, *i.e.*, a space having as many dimensions as there are variables (attributes) under consideration. Any phenon will thus appear as a cloud of points in the attribute hyperspace, the dimensions of the cloud reflecting the variability.

Two phena are distinct if their representative clouds are separated by a void region: a morphological gap. In this work, only full separations (with no overlap) will be taken into account.

3.2.1. The attribute hyperspaces where the morphological gaps occur have far too many dimensions to be visualized as such. We can observe these gaps only in reduced spaces (with two or three dimensions). Hence the intensive use of scatter diagrams (projection of the attribute hyperspace on the plane of two selected axes), principal component analysis and factorial discriminant analysis. It is important to keep in mind that if two clouds are separated in a scatter diagram, then they are *a fortiori* separated in the attribute hyperspace.

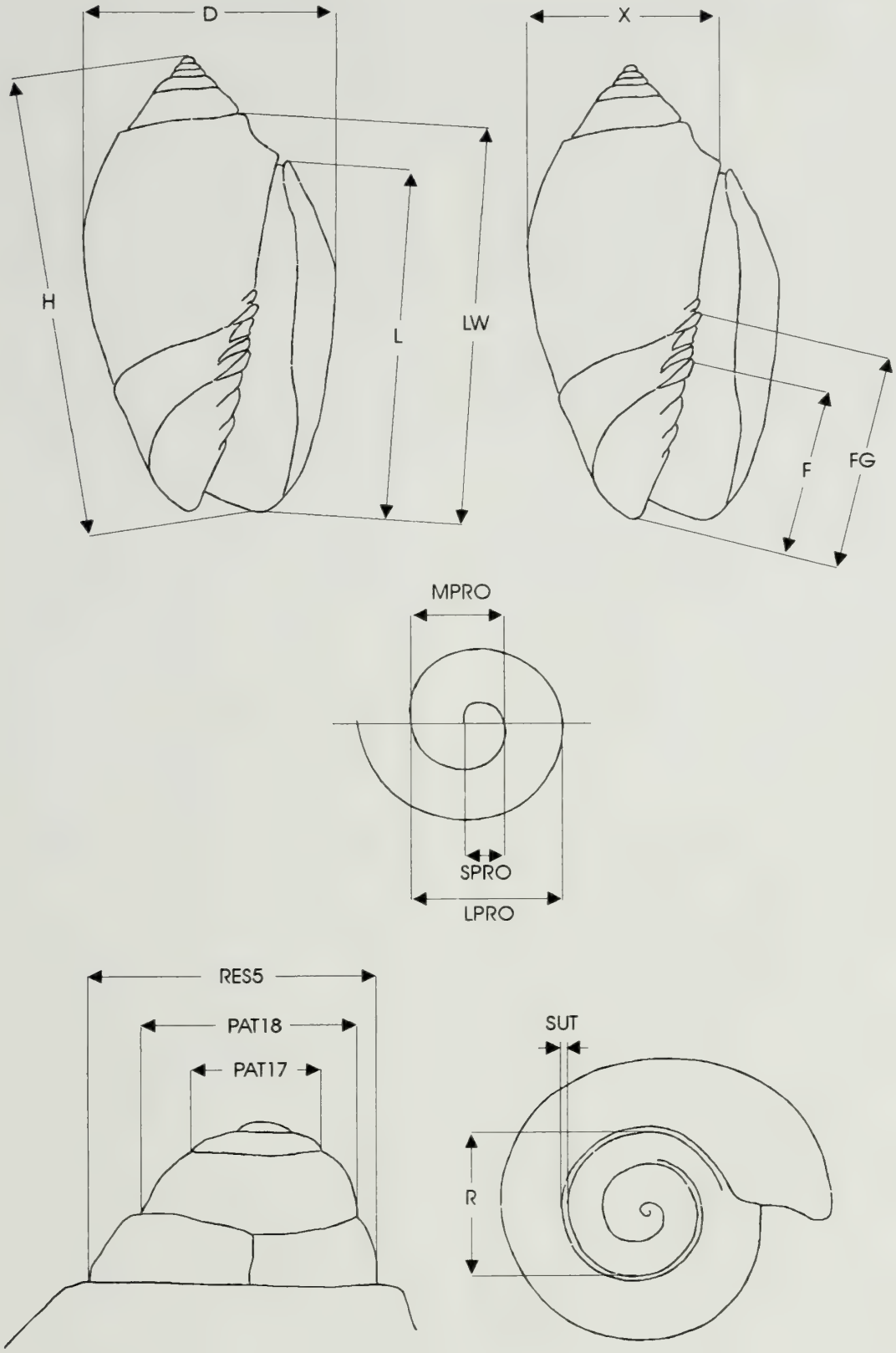


Fig. 1. Shell measurements utilised in this work. See text § 3.1.1.

Finding operational morphological gaps is of course much facilitated if one has an idea of the way in which the taxa are distributed in the multidimensional attribute space. Principal component analysis does provide this kind of information.

3.2.2. Great care should be exercised in the interpretation of the observed separations. First, one has to consider the size of the samples. Weak separations obtained on small samples (from our experience, N<5) might be indicative in scatter diagrams, but must be considered with caution. In contrast, observed overlaps are always significant, as these will persist if the size of the sample is increased. The problem of detecting separations is aggravated in multidimensional hyperspaces, where small gaps observed between small samples should be interpreted with great suspicion.

The interpretation of morphometric separations in terms of distinct species is straightforward only for samples that are syntopic (*i.e.*, actually live together, in the same microbiotope). It has been shown (TURSCH, 1994) that *Oliva* species consist of a mosaic of distinct, rather homogeneous populations. When a number of such local, conspecific populations are compared, they invariably show considerable character overlap. The species is thus represented in the attribute hyperspace by a *morphological continuum*. This is a set in which no population (or groups of populations) can be separated from *all* the others. Even if two populations of the continuum can be easily separated, the gap is invariably bridged by another conspecific population (or a morphologically unbroken chain of populations).

Completely separable populations of one same species can occur even within very short geographic distances (TURSCH, 1994). Separations between pairs of conspecific populations are thus fully expected (see MAYR, 1969 and FUTUYMA, 1986) and do not constitute grounds for specific discrimination. Well on the contrary, observation that very similar *Oliva* phena do never co-occur constitutes a strong indication of their conspecificity (TURSCH, 1995).

In the morphospecies approach, specific discrimination can be established only by the separation of sets containing as many different local populations as possible. Even with a small number of specimens, samples including shells from different localities include much more of the total variability of the species. Clear separations of such samples are most probably significant.

3.3. Preliminary grouping: working hypothesis.

The ideal, objective approach would consist in delimiting objective phena by grouping individual shells, identified only by locality and specimen numbers. This method works very well in studies involving only two or three phena. It becomes unworkable if the number of local phena is large, as it is the case here. It was thus necessary to make a preliminary grouping of our study sample into provisional phena, considered distinct as a *working hypothesis*. The validity of this hypothesis could then be tested by data analysis. Phena that could not be objectively separated were of course grouped together. The taxonomic rank of the remaining, objectively separable phena could then be determined by considerations of geographical distribution.

Many of the shells in this study could easily be classified into commonly admitted taxa. There is today a broad consensus on the identity of *O. hirasei* Kira, 1959, *O. ponderosa* Duclos, 1840 and *O. sericea* (Röding, 1798). Specimens from India and Sri Lanka are easily recognized as *O. tremulina flammeacolor* Petuch & Sargent, 1986 (here after designated as "*O. flammeacolor*", for short). All the South-West Pacific *O. miniacea s.l.* (Röding, 1798) could be grouped without any apparent problem. This was also the case with the "normal" *O. tremulina* Lamarck, 1811 from E. Africa and the Western Indian Ocean. Other shells were not so easy.

O. concinna Marrat, 1870 has different interpretations, depending upon the authors, as the type lot consists of two different species (see *concinna* under section 6, Systematics). The name is here restricted to the shell represented in Fig. 100 of the *Thesaurus* (one of two syntypes, MCM, from New Caledonia). There is also no unanimity on the identity of *Oliva atalina* Duclos, 1935 (see *atalina* under section 6, Systematics).

We could not identify a familiar but unnamed *Oliva* from Aldabra, Chagos, Mauritius and the Seychelles. These shells were kept separate as a temporary phenon ***MS***, that will be shown to constitute an unnamed species, *Oliva mascarena* n. sp., described here under. We also had identification problems with *miniacea*-like shells from Indonesia, kept separate as a temporary phenon ***IN***, *miniacea*-like shells from West Thailand, kept separate as a temporary phenon ***WT*** and *miniacea*-like shells from East Thailand, kept separate as a temporary phenon ***ET***.

We thus started this study with a working hypothesis consisting of 12 phena: *Oliva atalina* Duclos, 1935, *O. concinna* Marrat, 1870, *O .hirasei* Kira, 1959, *O. ponderosa* Duclos, 1840, *O. sericea* (Röding, 1798), *O. flammeacolor* Petuch & Sargent, 1986, *O. miniacea s.l.* (Röding, 1798), *O. tremulina* Lamarck, 1811, and the phena *MS*, *IN*, *WT* and *ET*. We now had to check whether these phena constitute objectively separable entities or not.

4. THE DELIMITATION OF OBJECTIVE PHENA.

4.1. Principal component analysis.

Principal component analysis was performed separately on teleoconch and protoconch characters. The study sample (here after referred to as List A) consisted of 120 specimens, all with an intact protoconch. This included 50 specimens of *O. miniacea* (4 from Australia, 4 from the Carolines, 3 from Fiji, 3 from Guam, 4 from Japan, 4 from the Marshalls, 4 from New Caledonia, 2 from Undispensable Reef, 6 from Papua New Guinea, 4 from the Philippines, 3 from Samoa, 3 from the Solomons, 3 from Tonga and 3 from Vietnam), 20 *O. tremulina* (5 from Mauritius, 5 from Madagascar, 3 from Mozambique, 1 from Reunion, 5 from the Seychelles and 1 from Tanzania), one *O. atalina* (Mauritius, only specimen available with intact protoconch), 3 *O. ponderosa* (Maldives), 4 specimens of phenon *WT* (W. Thailand), 3 specimens of phenon *ET* (E. Thailand), 9 *O. flammeacolor* (4 from India and 5 from Sri Lanka), 8 specimens of phenon *IN* (Indonesia), 7 specimens of phenon *MS* (3 from Mauritius, 3 from Seychelles and 1 from Chagos), 5 *O. sericea* (3 from Indonesia, 1 from Papua New Guinea, 1 from New Caledonia), 5 *O. concinna* (1 from the Philippines, 3 from the Solomons and 1 from Vanuatu) and 5 *O. hirasei* (from the Philippines, 2 localities).

At this stage, separation of phena can only be suggested, due to the small number of specimens of each local phenon. In contrast, observed overlaps are significant (see § 3.2.2).

4.1.2. Principal components analysis on teleoconch data. The 120 specimens of list A were included in a principal component analysis on 14 teleoconch variables: L/H, D/H, R/H, X/H, F/H, FG/H, SUT/H, SUT/R, (H-L)/H, (D-X)/D, H/PNW, D/PNW, SUT/PNW and F/PNW, selected, after many trials, for their discrimination power. 74.7% of the total variation are accounted for (38% on representation axis 1, 19.2% on axis 2 and 17.5% on axis 3).

4.1.2.1. Plane of axes 1, 2. The quality of representation on axes 1 and 2 (Fig. 2) is mediocre, 57.2% of the total variation being accounted for. It can be seen that *O. miniacea* (M) occupies a very large area and overlaps with all the other phena. *O. tremulina* (T), phenon *WT*, and *O. flammeacolor* (F) form a continuous chain of overlapping phena, distinct from another such chain consisting of *O. ponderosa* (P), phenon *MS*, *O. sericea* (S) and *O. concinna* (C). The two chains are here bridged by the Indonesian phenon *IN*. Not much can be said about *O. atalina* (A), represented by a single specimen. The relatively isolated position of *O. hirasei* (H), overlapping only with *O. miniacea* (M) suggests that this group could be easily isolated.

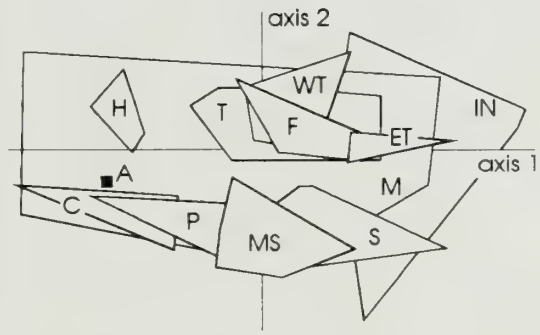


Fig. 2. Principal component analysis on teleoconch data. Plane of axes 1 and 2. 14 variables: L/H, D/H, R/H, X/H, F/H, FG/H, SUT/H, SUT/R, (H-L)/H, (D-X)/D, H/PNW, D/PNW, SUT/PNW and F/PNW. Representation: minimum convex polygons. 57.2 % of the total variation accounted for. Total sample: 120 specimens (List A). **A**: *O. atalina* (Mauritius, N=1). **C**: *O. concinna* (Philippines, Solomons, Vanuatu, N=5). **ET**: phenon *ET* (E. Thailand, 1 locality, N=3). **F**: *O. flammeacolor* (India, Sri Lanka, N=9). **H**: *O. hirasei* (Philippines, 2 localities, N=5). **IN**: phenon *IN* (Indonesia, 3 localities, N=8). **M**: *O. miniacea* (S.W. Pacific, many localities, N=50). **MS**: phenon *MS* (*O. mascarena* n. sp., Chagos, Mauritius, Seychelles, N=7)). **P**: *O. ponderosa* (Maldives, 3 localities, N=3). **S**: *O. sericea* (Indonesia, Papua New Guinea, New Caledonia, N=5). **T**: *O. tremulina* (Madagascar, Mauritius, Mozambique, Reunion, Seychelles, Tanzania, N=20). **WT**: phenon *WT* (W. Thailand, 1 locality, N=4).

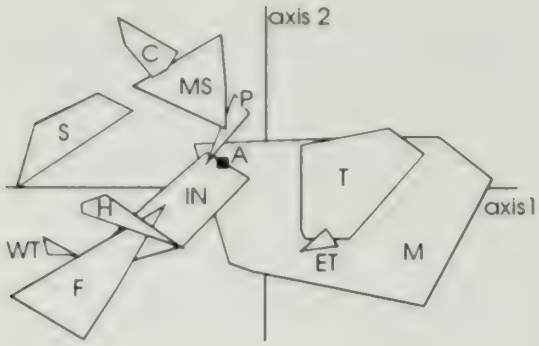


Fig. 3. Principal component analysis on protoconch data. Plane of axes 1 and 2. 7 variables: NW, MPRO, LPRO, (LPRO-SPRO), RES5, PAT17 and PAT18. Representation: minimum convex polygons. 89.6% of the total variation accounted for. Total sample: 120 specimens (List A). **A**: *O. atalina* (Mauritius, N=1). **C**: *O. concinna* (Philippines, Solomons, Vanuatu, N=5). **ET**: phenon *ET* (E. Thailand, 1 locality, N=3). **F**: *O. flammeacolor* (India, Sri Lanka, N=9). **H**: *O. hirasei* (Philippines, 2 localities, N=5). **IN**: phenon *IN* (Indonesia, 3 localities, N=8). **M**: *O. miniacea* (S.W. Pacific, many localities, N=50). **MS**: phenon *MS* (*O. mascarena* n. sp., Chagos, Mauritius, Seychelles, N=7)). **P**: *O. ponderosa* (Maldives, 3 localities, N=3). **S**: *O. sericea* (Indonesia, Papua New Guinea, New Caledonia, N=5). **T**: *O. tremulina* (Madagascar, Mauritius, Mozambique, Reunion, Seychelles, Tanzania, N=20). **WT**: phenon *WT* (W. Thailand, 1 locality, N=4).

4.1.2.2. Plane of axes 2, 3. Only 57.2% of the total variation was accounted for along axes 1 and 2. The representation on the plane of axes 2 and 3 (not given here) accounts for 55.5% of the total variation but does not bring any additional information.

4.1.3. Principal components analysis on protoconch data. The 120 specimens of list A were included in a principal component analysis on 7 protoconch measurements: NW, MPRO, LPRO, (LPRO-SPRO), RES5, PAT17, PAT18. The quality of the representation on axes 1 and 2 (Fig. 3) is very good, 89.6% of the total variation being accounted for (an example of the discriminatory power of protoconch characters). 61% of the total variation are accounted for on axis 1, 28.6% on axis 2, and only 5% on axis 3.

It can now be clearly seen that the sample is heterogeneous. *O. sericea* (S), *O. concinna* (C) and phenon *MS* are separated from an apparently continuous chain of other taxa. The position of *O. ponderosa* (P) is intermediate and confirms its similarity to *O. miniacea* (M).

The single specimen of *O. atalina* (A) indicates that there is little hope to separate this taxon from *O. miniacea* (M) on protoconch characters.

O. flammeacolor (F) is very close to phenon *WT* (W. Thailand) and appears well separated from *O. miniacea* (M) but the two groups are bridged by phenon *IN* (Indonesia). *O. miniacea* (M) completely covers *O. tremulina* (T) and phenon *ET* (E. Thailand). All these taxa possibly form a single morphological continuum.

4.1.4. Interpretation.

4.1.4.1. The O. miniacea populations. On both Figs. 2 and 3, it can be seen that *O. miniacea* (M) occupies a much larger area than the other phena. In such representations, the size of the area occupied by a given phenon reflects its total variability. The large spread observed for *O. miniacea* raises questions. Is this simply due to the larger number (50) of specimens? Are we dealing with rather similar, but extremely variable local populations? Or are we dealing with a mosaic of many distinct, rather homogeneous populations? Or is our provisional phenon *O miniacea* heterogeneous, containing populations of other species?

One answer can be found in Fig. 4 (representing the constituents of the *O. miniacea* polygon of Fig. 2) and Fig. 5 (representing the constituents of the *O. miniacea* polygon of Fig. 3, slightly enlarged). We are obviously in presence of a multitude of different local phena, each rather homogeneous. This was fully expected: an experienced *Oliva* student can often take a rather accurate guess as to the region of origin of a given specimen of *O. miniacea*.

4.1.4.2. The O. miniacea continuum. We still have to show that our provisional phenon *O miniacea* is homogeneous. On both figures 4 and 5, one notices much overlap in the distribution of the characters. The following pairs of groups separated: **a-e**, **e-k**, **e-c**, **k-o**, **a-j** and **a-i** are separated neither by teleoconch (Fig. 4) nor by protoconch characters (Fig. 5). This establishes the existence of a morphologically continuous chain of local populations: **i** (Papua New Guinea, Hansa Bay), **j** (Papua New Guinea, Rabaul), **a** (Australia), **e** (Japan), **c** (Fiji), **k** (Philippines) and **o** (Vietnam). The

same can be said for the pairs **d-b** and **d-f**, establishing the existence of another chain **d** (Guam), **b** (Caroline Is.) and **f** (Marshall Is.). For each of these groups, we have no choice but to group all the populations into a single minimum convex polygon (see Figs. 6 and 7).

Due to the small size of the samples (see § 3.2.2), the very small separation of groups **h** and **l** (in Figs. 5 and 7) cannot be taken as being of any significance. It then becomes clear (from Figs. 6 and 7) that the grouping of all the samples included under our provisional phenon *O. miniacea* (see § 3.3) is justified. In spite of much effort, all our subsequent attempts to break this group apart by consecutive scatter diagrams did fail. We are in presence of a single, uninterrupted morphological continuum, consisting in a multitude of overlapping, rather homogeneous local phena. This situation was fully expected from previous studies on *Oliva* (TURSCH, 1994). A seeming objection is that we have dealt only with a small number of populations of a very widespread species. Inclusion of more populations could only fill the voids in Figs. 4 and 5, thus reinforcing our conclusion.

With the results of principal component analysis at hand, we can now proceed to select operational discriminants, either for individual taxa or for groups of taxa.

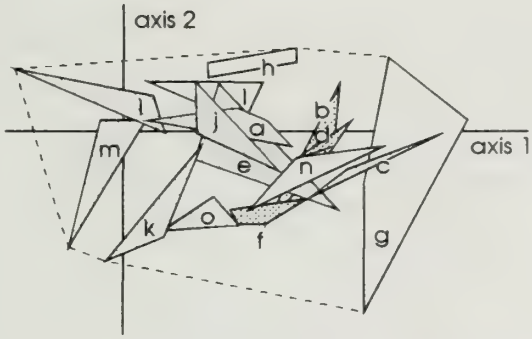


Fig. 5. Principal component analysis on protoconch data. Plane of axes 1 and 2. Partial view: the constituents of the *O. miniacea* polygon of Fig. 3, (slightly enlarged, all other groups removed). Sample: 50 specimens (see text § 4.1, list A). **a**: Australia. **b**: Caroline Is. **c**: Fiji. **d**: Guam. **e**: Japan. **f**: Marshall Is. **g**: New Caledonia, main island. **h**: New Caledonia, Undispensable Reef. **i**: Papua New Guinea, Hansa Bay. **j**: Papua New Guinea, Rabaul.**k**: Philippines. **l**: Samoa. **m**: Solomon Is. **n**: Tonga. **o**: Vietnam.

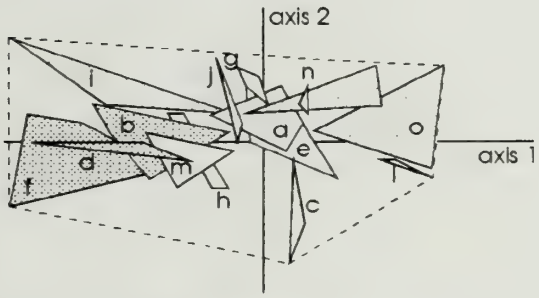


Fig. 4. Principal component analysis on teleoconch data. Plane of axes 1 and 2. Partial view: the constituents of the *O. miniacea* polygon of Fig. 2 (all other groups removed). Sample: 50 specimens (see text § 4.1, list A). **a**: Australia. **b**: Caroline Is. **c**: Fiji. **d**: Guam. **e**: Japan. **f**: Marshall Is. **g**: New Caledonia, main island. **h**: New Caledonia, Undispensable Reef. **i**: Papua New Guinea, Hansa Bay. **j**: Papua New Guinea, Rabaul.**k**: Philippines. **l**: Samoa. **m**: Solomon Is. **n**: Tonga. **o**: Vietnam.

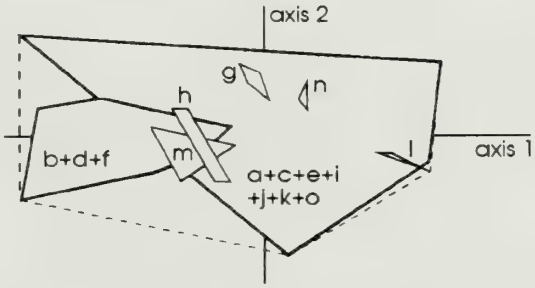


Fig. 6. Principal component analysis on teleoconch data. Plane of axes 1 and 2. Partial view: the constituents of the *O. miniacea* polygon of Fig. 2 (all other groups removed). Same as Fig. 4, but the two groups (a+c+e+i+j+k+o) and (b+d+f) of unseparable populations are now represented by their minimum convex polygons. **a**: Australia. **b**: Caroline Is. **c**: Fiji. **d**: Guam. **e**: Japan. **f**: Marshall Is. **g**: New Caledonia, main island. **h**: New Caledonia, Undispensable Reef. **i**: Papua New Guinea, Hansa Bay. **j**: Papua New Guinea, Rabaul.**k**: Philippines. **l**: Samoa. **m**: Solomon Is. **n**: Tonga. **o**: Vietnam.

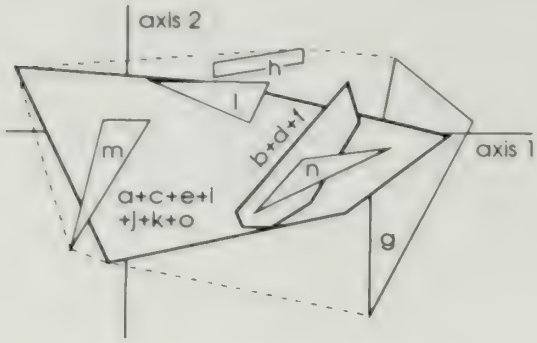


Fig. 7. Principal component analysis on protoconch data. Plane of axes 1 and 2. Partial view: the constituents of the *O. miniacea* polygon of Fig. 3, (slightly enlarged, all other groups removed). Same as Fig. 5, but the two groups (a+c+e+i+j+k+o) and (b+d+f) of unseparable populations are now represented by their minimum convex polygons. **a**: Australia. **b**: Caroline Is. **c**: Fiji. **d**: Guam. **e**: Japan. **f**: Marshall Is. **g**: New Caledonia, main island. **h**: New Caledonia, Undispensable Reef. **i**: Papua New Guinea, Hansa Bay. **j**: Papua New Guinea, Rabaul.**k**: Philippines. **l**: Samoa. **m**: Solomon Is. **n**: Tonga. **o**: Vietnam.

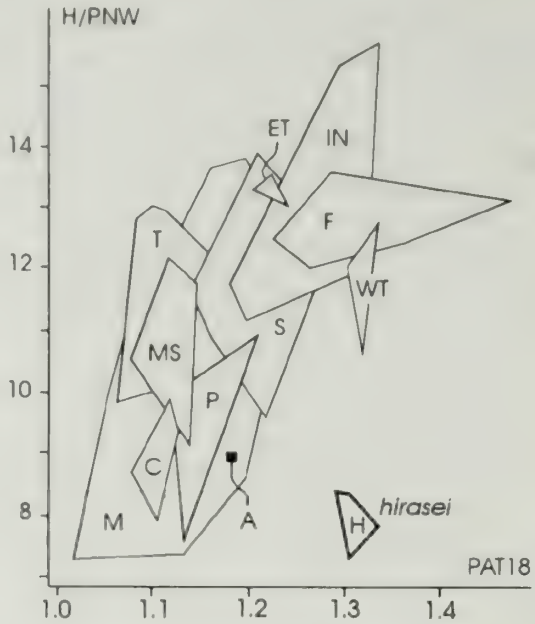


Fig. 8. Separation of *O. hirasei*. Scatter diagram: H/PNW *vs.* PAT18. Minimum convex polygons. **A**: *O. atalina* (Mauritius, N=1). **C**: *O. concinna* (Philippines, Solomon Is., Vanuatu, N=5). **ET**: Phenon *ET* (E. Thailand, 1 locality, N=3). **F**: *O. flammeacolor* (India, Sri Lanka, N=9). **H**: *O. hirasei* (Philippines, 2 localities, N=5). **IN**: phenon *IN* (Indonesia, 3 localities, N=8). **M**:*O. miniacea* (S.W. Pacific, many localities, N=50). **MS**: phenon *MS* (*O. mascarena* n. sp., Chagos, Mauritius, Seychelles, N=7)). **P**: *O. ponderosa* (Maldives, 3 localities, N=6). **S**: *O. sericea* (Indonesia, Papua New Guinea, New Caledonia, N=5). **T**: *O. tremulina* (Madagascar, Mauritius, Mozambique, Reunion, Seychelles, Tanzania, N=20). **WT**: Phenon *WT* (W. Thailand, 1 locality, N=4).

4.2. Separation of *O. hirasei*.

Principal components analysis (§ 4.1.2.1, Fig. 2) suggested that *O. hirasei* (H) could be easily separated from the remainder of the study sample. This is indeed the case. Total, convincing separation is obtained, for instance in a scatter diagram of H/PNW *vs.* PAT18 (Fig. 8). This establishes *O. hirasei* as an objective, separable taxon. It needs no more to be included in the following separations.

4.3. Separation of *O. sericea, O. concinna* and phenon *MS*.

Principal components analysis (§ 4.1.3, Fig. 3) also suggested that a group formed of *O. sericea* (S), *O. concinna* (C) and phenon *MS* (*Oliva mascarena* n. sp., see below) could be easily separated from the remainder of the study sample. Total separation is indeed achieved, for instance in the scatter diagram of NW/LPRO *vs.* H/F (Fig. 9).

The next step was to check if the three phena that we have just separated (as a group, from the remainder of the sample) constitute separable entities. The much wider protoconch of *O. sericea* separates it easily from both phena *MS* (*O. mascarena* n. sp.) and *O. concinna*, as evidenced in Fig. 10, the scatter diagram of PAT18 *vs.* RES5.

In turn, phenon *MS* (*O. mascarena* n. sp.) and *O. concinna* are totally separated in a scatter diagram of (H-L)/L *vs.* L/PNW (Fig. 11). Equally good separations are obtained with scatter diagrams (not illustrated here) of X/PNW *vs.* (H-L)/H, L/PNW *vs.* (H-L)/D, L/PNW *vs.* (H-L)/SUT, amongst others.

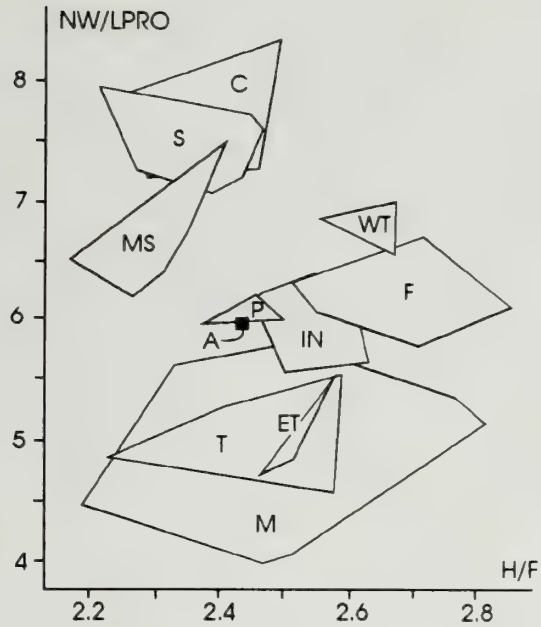


Fig. 9. Separation into two clusters. Scatter diagram: NW/LPRO *vs.* H/F. Minimum convex polygons. Total sample: 115 specimens (List A, with *O. hirasei* removed). **A**: *O. atalina* (Mauritius, N=1). **C**: *O. concinna* (Philippines, Solomon Is., Vanuatu, N=5). **ET**: Phenon *ET* (E. Thailand, 1 locality, N=3). **F**: *O. flammeacolor* (India, Sri Lanka, N=9). **IN**: phenon *IN* (Indonesia, 3 localities, N=8). **M**:*O. miniacea* (S.W. Pacific, many localities, N=50). **MS**: phenon *MS* (*O. mascarena* n. sp., Chagos, Mauritius, Seychelles, N=7)). **P**: *O. ponderosa* (Maldives, N=6). **S**: *O. sericea* (Indonesia, Papua New Guinea, New Caledonia, N=5). **T**: *O. tremulina* (Madagascar, Mauritius, Mozambique, Reunion, Seychelles, Tanzania, N=20). **WT**: Phenon *WT* (W. Thailand, 1 locality, N=4).

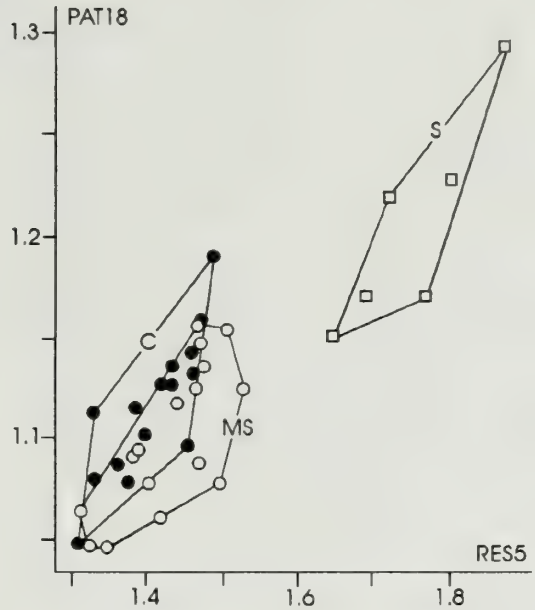


Fig. 10. Separation of *O. sericea* from phenon *MS* (*O. mascarena* n. sp.) and *O. concinna*. Scatter diagram: PAT18 *vs.* RES5. Minimum convex polygons. **C**: *O. concinna* (Papua New Guinea, Philippines, Solomon Is., Vanuatu, black circles, N=15). **MS**: phenon *MS* (*O. mascarena* n. sp., Chagos, Mauritius, Seychelles, white circles, N=17). **S**: *O. sericea* (Indonesia, Papua New Guinea, New Caledonia, white squares, N=6).

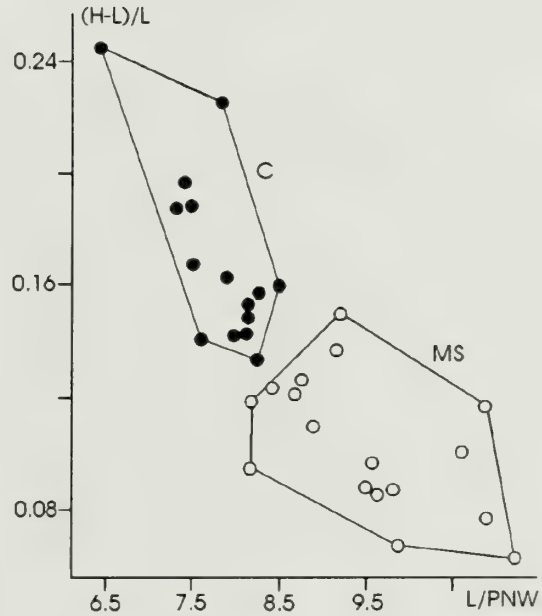


Fig. 11. Separation of *O. concinna* from phenon *MS* (*O. mascarena* n. sp.). Scatter diagram: (H-L)/L *vs.* L/PNW. Minimum convex polygons. **C**: *O. concinna* (Papua New Guinea, Philippines, Solomon Is., Vanuatu, black circles, N=15). **MS**: phenon *MS* (*O. mascarena* n. sp., Chagos, Mauritius, Seychelles, white circles, N=17).

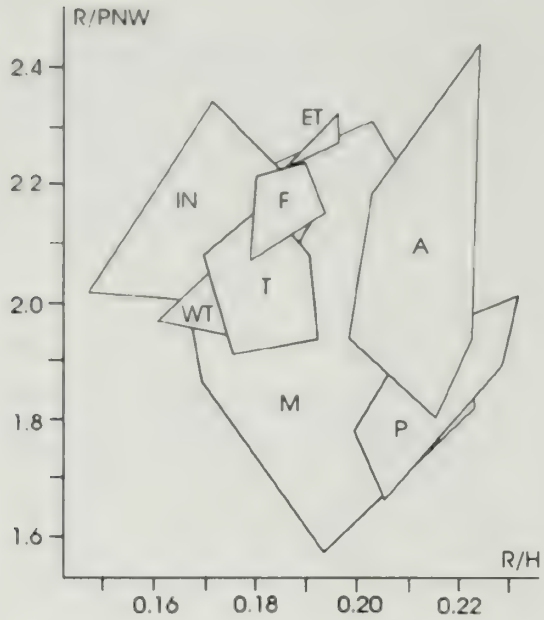


Fig. 12. Example of partial separation. Scatter diagram: R/PNW *vs.* R/H. Minimum convex polygons. Total sample:130 specimens. **A**: *O. atalina* (Cargados Carajos, Mauritius, N=18). **ET**: phenon *ET* (E. Thailand, 1 locality, N=3). **F**: *O. flammeacolor* (India, Sri Lanka, N=9). **IN**: phenon *IN* (Indonesia, 3 localities, N=8). **M**:*O. miniacea* (S.W. Pacific, many localities, N=65). **P**: *O. ponderosa* (Maldives, 3 localities, N=13). **T**: *O. tremulina* (Madagascar, Mauritius, Mozambique, Reunion, Seychelles, Tanzania, N=20). **WT**: phenon *WT* (W. Thailand, 1 locality, N=4).

4.4. The "*Oliva miniacea* complex".

At this stage, we have easily separated four recognizable phena, *O. hirasei*, *O. sericea*, *O. concinna* and phenon *MS* (*O. mascarena* n. sp.) from the initial sample of 12 provisional phena.

The 8 remaining provisional phena are: *Oliva atalina*, *O. flammeacolor*, *O. miniacea*, *O. ponderosa*, *O. tremulina* and the phena *WT* (West Thailand), *ET* (East Thailand) and *IN* (Indonesia). These closely related phena form now a much more compact group, where separations are much less evident. For facility, let us call this the "*Oliva miniacea* complex". Does this complex constitute a morphological continuum (in which no group can be separated from *all* the others)? Or does it still contain separable entities?

4.5. The "*Oliva miniacea* complex". Separation of *O. atalina*.

4.5.1. Principal components analysis of teleoconch characters (§ 4.1.2.1, Fig. 2) suggested that *O. ponderosa* (and possibly *O. atalina*) could be easily separated from *O. tremulina*, *O. flammeacolor*, phena *WT*, *ET* and *IN*. Many scatter diagrams, such as R/PNW *vs.* R/H (Fig. 12), including all available specimens, do indeed totally separate a group formed of *O. atalina* and *O. ponderosa* from a compact group formed by *O. tremulina*, *O. flammeacolor*, phena *WT*, *ET* and *IN*. Both groups are bridged only by *O. miniacea*. So the problem is now reduced to separating *O. atalina* from *O. miniacea* and from *O. ponderosa*.

4.5.2. On the basis of shell measurements, *O. atalina* is not easy to discriminate from *O. ponderosa*, but total separation is achieved in the scatter diagram of FG/F *vs.* RES5 (Fig. 13), including all specimens on which RES5 could be measured.

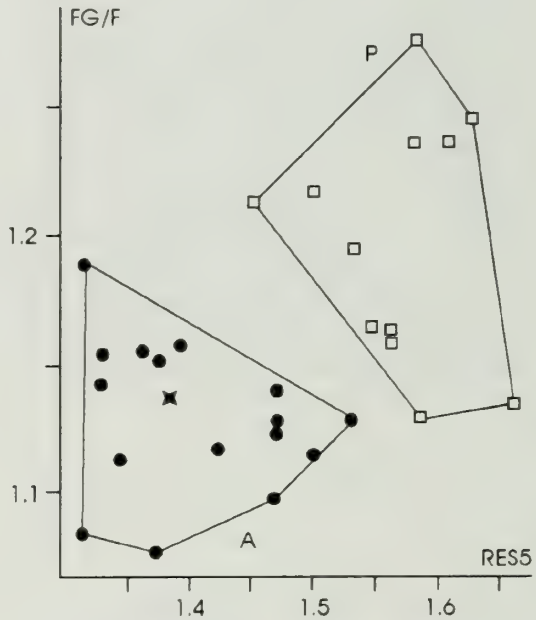


Fig. 13. Separation of *O. atalina* from *O. ponderosa*. Scatter diagram: FG/F *vs.* RES5. Representation: minimum convex polygons. Total sample: 29 specimens. **A**: *O. atalina* (Cargados Carajos, Mauritius, black circles, N=16. Largest syntype of *O. stainforthi*: black star). **P**: *O. ponderosa* (Maldives, 3 localities, white squares, N=12).

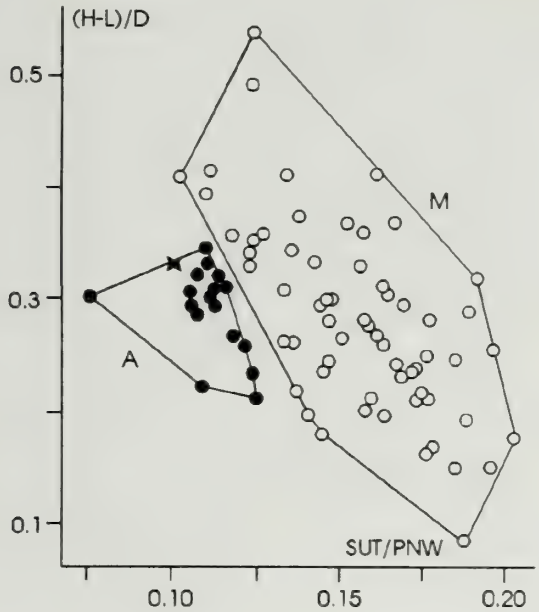


Fig. 14. Separation of *O. atalina* from *O. miniacea*. Scatter diagram: (H-L)/D *vs.* SUT/PNW. Minimum convex polygons. Total sample: 81 specimens. **A**: *O. atalina* (Cargados Carajos, Mauritius, black circles, N=16. Largest syntype of *O. stainforthi*: black star). **M**: *O. miniacea* (S.W. Pacific, many localities, white circles, N=65).

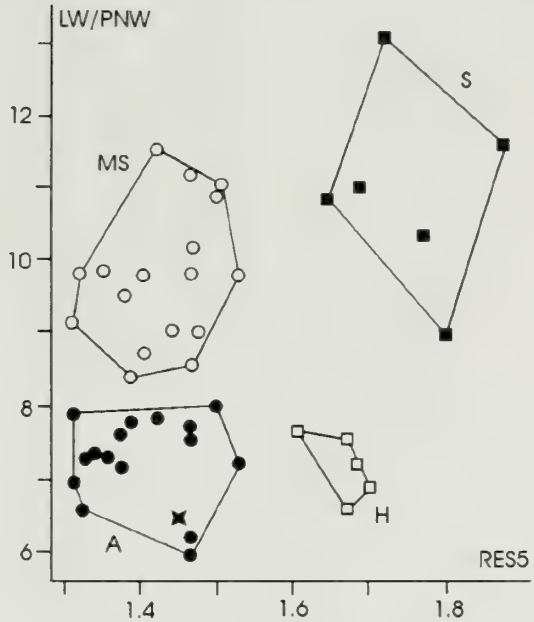


Fig. 15. Separation of *O. atalina*, *O. hirasei*, phenon *MS* (*O. mascarena* n. sp.) and *O. sericea*. Scatter diagram: LW/PNW *vs.* RES5. Minimum convex polygons. Total sample: 81 specimens. **A**: *O. atalina* (Cargados Carajos, Mauritius, black circles, N=16. Largest syntype of *O. stainforthi*: black star). **H**: *O. hirasei* (Philippines, 2 localities, white squares, N=5). **MS**: phenon *MS* (*O. mascarena* n. sp., Chagos, Mauritius, Seychelles, white circles, N=17). **S**: *O. sericea* (Indonesia, Papua New Guinea, New Caledonia, black squares, N=6).

4.5.3. *O. atalina* is even more difficult to discriminate from *O. miniacea* by shell measurements. It is indeed quite similar in shape to some populations of *O. miniacea*, and the two phena overlap in many attempts at discrimination. Total separation is nevertheless obtained in the scatter diagram of (H-L)/D *vs.* SUT/PNW (Fig. 14).

4.5.4. We still have to check whether *O. atalina* is distinct from phenon *MS* (*O. mascarena* n. sp.), *O. hirasei*, *O. sericea* and *O. concinna*, because these groups were separated on protoconch characters, when only one specimen of *O. atalina* was present. *O. atalina* is so different from phenon *MS* (*O. mascarena* n. sp.), *O. hirasei* and *O. sericea* that they are totally separated on one single scatter diagram: LW/PNW *vs.* RES5 (Fig. 15). Complete separation of *O. atalina* from phenon *MS* (*O. mascarena* n. sp.) is also given in Fig. 16, a scatter diagram of LW/PNW *vs.* H/R.

4.5.5. On the basis of shell measurements, *O. atalina* is also rather close to *O. concinna*, but the two taxa are separated, for instance in the scatter diagram of 100*(SUT/F) *vs.* (H-L)/R (Fig. 17).

4.5.6. There is still a point to be elucidated. Even in the recent literature (BURCH & BURCH, 1960; ZEIGLER & PORRECA, 1969; WAGNER & ABBOTT, 1967), *O. atalina* has repeatedly been considered as being only a white-mouthed form of the common *O. caerulea* (Röding, 1798). This can easily be dispelled by the scatter diagram of 100*(SUT/LW) *vs.* F/L (Fig. 18). We can now consider *O. atalina* a completely distinct phenon.

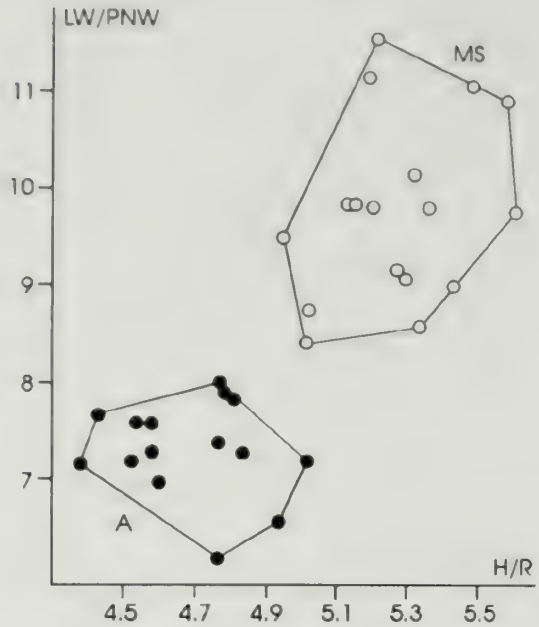


Fig. 16. Separation of *O. atalina* from phenon *MS* (*O. mascarena* n. sp). Scatter diagram: LW/PNW *vs.* H/R. Minimum convex polygons. Total sample: 32 specimens. **A**: *O. atalina* (black circles, N=15, 4 localities, see text § 2.2). **MS**: *O. mascarena* n. sp. (white circles, N=17, 4 localities, see text § 2.2).

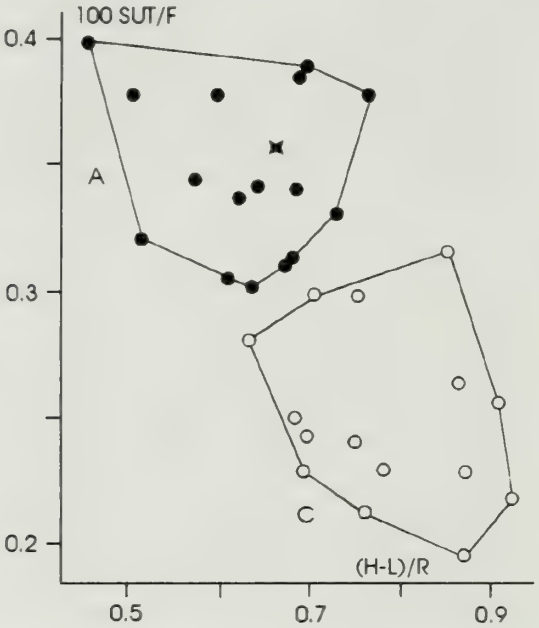


Fig. 17. Separation of *O. atalina* and *O. concinna*. Scatter diagram: 100*SUT/F *vs.* (H-L)/R. Minimum convex polygons. Total sample: 32 specimens. **A**: *O. atalina* (Cargados Carajos, Mauritius, black circles, N=16. Largest syntype of *O. stainforthi*: black star). **C**: *O. concinna* (Papua New Guinea, Philippines, Solomon Is., Vanuatu, white circles, N=15).

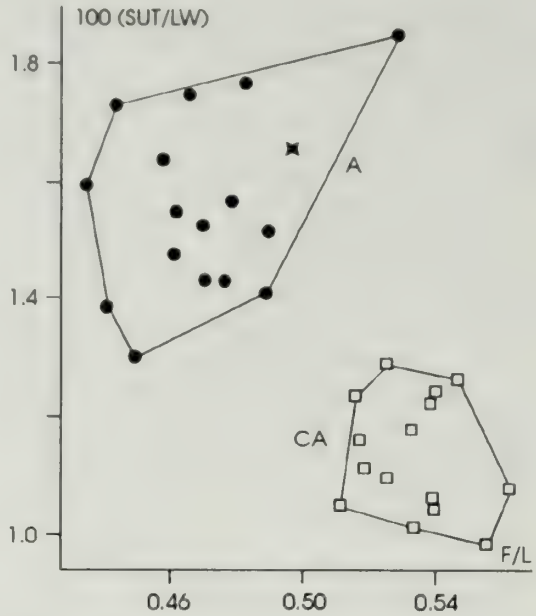


Fig. 18. Separation of *O. atalina* and *O. caerulea*. Scatter diagram: 100 SUT/LW *vs.* F/L. Minimum convex polygons. Total sample: 31 specimens. **A**: *O. atalina* (Cargados Carajos, Mauritius, black circles, N=16. Largest syntype of *O. stainforthi*: black star). **CA**: *O. caerulea* (Papua New Guinea, Philippines, Solomon Is., Vanuatu, white squares, N=15).

4.6. The "*Oliva miniacea* complex". Separation of *O. ponderosa*.

We have now to establish whether *O. miniacea* is distinct from *O. ponderosa* or not. This is not as evident as one could believe: some specimens of *O. miniacea* from Micronesia or Northern Bali (see WITTIG-SKINNER, 1981) are quite similar to *O. ponderosa*, excepted for the colour of the aperture. This similarity probably indicates a close phyletic relationship.

A factorial discriminant analysis on the 10 variables RES5, FG/F, (H-L)/D, (H-L)/H, D/H, R/H, SUT/PNW, H/PNW, D/PNW and R/PNW was effected on all available specimens. This yielded 2 canonical discriminant functions F1 and F2. No case was excluded from the analysis. F1 accounts for 89.02% of the variance, (F1+F2) for 100%. The two canonical functions are:

F1 = -0.32720*RES5 -0.57837*FG/F + 2.18443*(H-L)/D -2.50547*(H-L)/H + 4.05754*D/H + 1.76846*R/H - 0.47104*SUT/PNW + 13.80281*H/PNW - 11.63914*D/PNW - 3.09034*R/PNW.

F2 = -0.60497*RES5 - 0.4612*FG/F + 6.58423*(H-L)/D - 5.72022*(H-L)/H + 2.49556*D/H + 1.86125*R/H + 0.30693*SUT/PNW + 10.70283*H/PNW - 5.25453*D/PNW - 5.58134*R/PNW.

The resulting graph (Fig. 19) does separate *O. atalina* from *O. ponderosa* and *O. atalina* from *O. miniacea* (confirming the result obtained in § 4.5). It also separates *O. ponderosa* from *O. miniacea*.

That *O. ponderosa* is effectively distinct from *O. miniacea* (in a 10-dimensional attribute hyperspace) is now established. But can we produce simpler discrimination guidelines? There seems to be a possibility of separation with a scatter diagram of MPRO/NW *vs.* R/H (Fig. 20), but so far this rests only on 3 specimens (*O. ponderosa* are mostly of commercial origin and specimens with perfect protoconch are not easy to obtain).

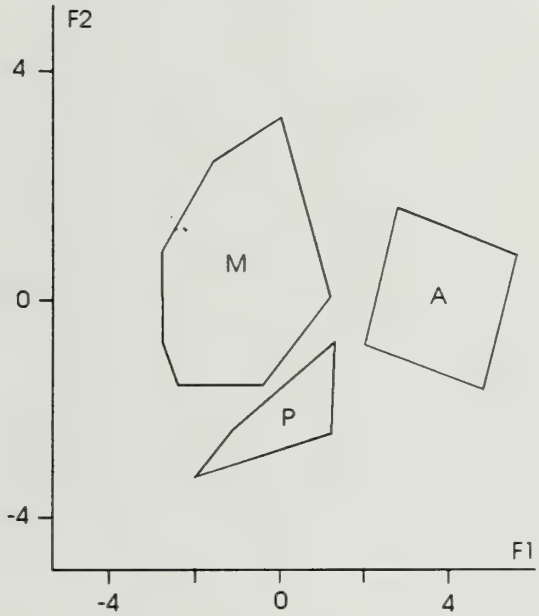


Fig. 19. Separation of *O. atalina, O. miniacea* and *O. ponderosa*. Factorial discriminant analysis. 10 variables: RES5, FG/F, (H-L)/D, (H-L)/H, D/H, R/H, SUT/PNW, H/PNW, D/PNW and R/PNW. 91 specimens. **A**: *O. atalina* (Cargados Carajos, Mauritius, N=16). **M**: *O. miniacea* (S.W. Pacific, many localities, N=64). **P**: *O. ponderosa* (Maldives, 3 localities, N=11). Minimum convex polygons. **F1**: first discriminant function, **F2**: second discriminant function (see text, § 4.5).

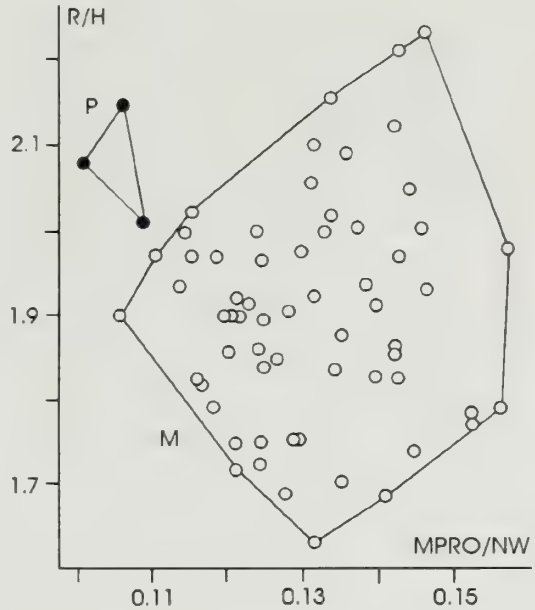


Fig. 20. Separation of *O. ponderosa* from *O. miniacea*. Scatter diagram: R/H *vs.* MPRO/NW. Minimum convex polygons. Total sample: 68 specimens. **A**: *O. ponderosa* (Maldives, 3 localities, black circles, N=3). **M**: *O. miniacea* (S.W. Pacific, many localities, white circles, N=65).

In practice, there is no real identification problem: *O. ponderosa* is readily separated from all other *miniacea*-like phena of the Indian Ocean, including Indonesia (see § 4.3, 4.5.1 and 4.5.2). It can also be separated from the Pacific *O. miniacea*, as it has always a pale aperture, together with a rather characteristic, stable colour pattern (see section 6: Systematics).

4.7. The "*Oliva miniacea* complex". The remaining phena.

4.7.1. The separations obtained so far are condensed in Table 1. It can be seen that all the remaining phena (*O. flammeacolor, O. miniacea, O. tremulina,* the phena *WT, ET* and *IN*) appear to form a morphological continuum, where no phenon can be clearly separated from <u>*all*</u> the others. In spite of considerable effort, no convincing separation could be found for breaking apart this group, be it by scatter diagrams, factorial discriminant analysis or principal components analysis. Very weak separations can sometimes be observed for phena *WT* (N=4, same locality) and *ET* (N=3, same locality), but these are clearly not significant (see § 3.2.2).

	F	M	IN	T	ET	WT	MS	P	A	C	H
M	f.7,8 S-										
IN	**NO** S-	**NO** S-									
T	f.7 S-	**NO** S-	**f.8**(1) S-								
ET	**NO**(2) S-	**NO** S-	**NO**(2) S-	**NO**(2) S-							
WT	**NO** S-	f.7,8 S-	f.8 S-	f.7 S-	f.7 S-						
MS	f.7,8 S-	f.8 S-	f.8 S-	f.8 S+	f.8 S-	f.8 S-					
P	f.11 S+	f.14 S-	f.11 S-	f.11 S-	f.11 S-	f.11 S-	f.8 S-				
A	f.11 S-	f.13 S-	f.11 S-	f.11 S+	f.11 S-	f.11 S-	f.13A S+	f.12 S-			
C	f.8 S+	f.8 S+	f.8 S+	f.8 S?	f.8 S?	f.8 S+	f.10 S-	f.8 S?	f.13B S?		
H	f.8 S-	f.8 S+	f.8 S?	f.8 S-	f.8 S-	f.8 S-	f.7 S-	f.8 S-	f.13A S-	f.7 S+	
S	f.8 S+	f.8 S+	f.8 S+	f.8 S+	f.8 S+	f.8 S+	f.9 S+	f.8 S+	f.13A S+	f.9 S+	f.7 S+

Table 1. Separable phena. For separable phena, an example of discriminant characters (refering to a text figure) is given. Phena that could not be separated are indicated by a bold border. **A**: *O. atalina* (Cargados, Mauritius). **C**: *O. concinna* (Philippines, Solomon Is., Vanuatu). **ET**: Phenon *ET* (E. Thailand, 1 locality). **F**: *O. flammeacolor* (India, Sri Lanka). **H**: *O. hirasei* (Philippines, 2 localities). **IN**: phenon *IN* (Indonesia, 3 localities). **M**:*O. miniacea* (S.W. Pacific, many localities). **MS**: phenon *MS* (*O. mascarena* n. sp., Chagos, Mauritius, Seychelles). **P**: *O. ponderosa* (Maldives, 3 localities). **S**: *O. sericea* (Indonesia, Papua New Guinea, New Caledonia). **T**: *O. tremulina* (Madagascar, Mauritius, Mozambique, Reunion, Seychelles, Tanzania). **WT**: Phenon *WT* (W. Thailand, 1 locality).

(1) doubtful separation. (2) the very weak separations observed in fig. 7 or fig. 8 not significant: WT and ET represent local populations, with very few representatives (see text, § 3.2.2). S+ means broadly sympatric. S- means allopatric. S? means no sympatry data.

We are thus compelled to admit that *O. flammeacolor, O. miniacea, O. tremulina,* the phena *WT, ET* and *IN* constitute one single, highly variable species, for which *Oliva miniacea s.l.* (Röding, 1798) is the oldest name.

4.7.2. This view is reinforced by the observation that all the remaining phena are allopatric (*i.e.,* do never co-occur). Their different aspects can be simply interpreted in terms of geographic variation (genetic and/or environmental). This is in full agreement with the conclusion of JOHNSON (1928): "This (*O. tremulina*) differs from *erythrostoma* only in the colour of the aperture, and in a large series it is impossible to draw a well defined line separating the two. There are also parallel variations in both, which, aside from the color of the aperture cannot be separated, another strong indication that we are dealing only with only one variable species."

4.7.3. Additional support comes from the observation of a roughly clinal variation in the colour of the shell aperture (the main historical argument for separating *O. miniacea* from *O. tremulina*). This is demonstrated in Fig. 21 where the colour of the aperture is plotted

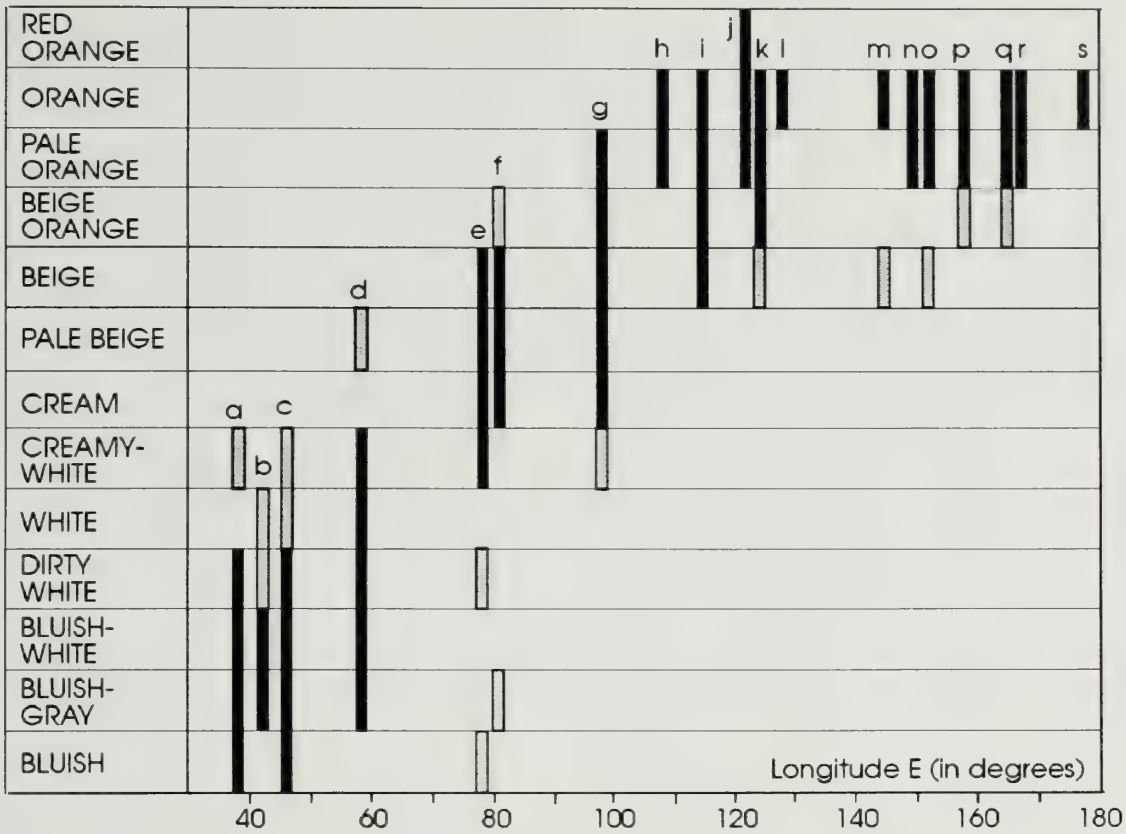
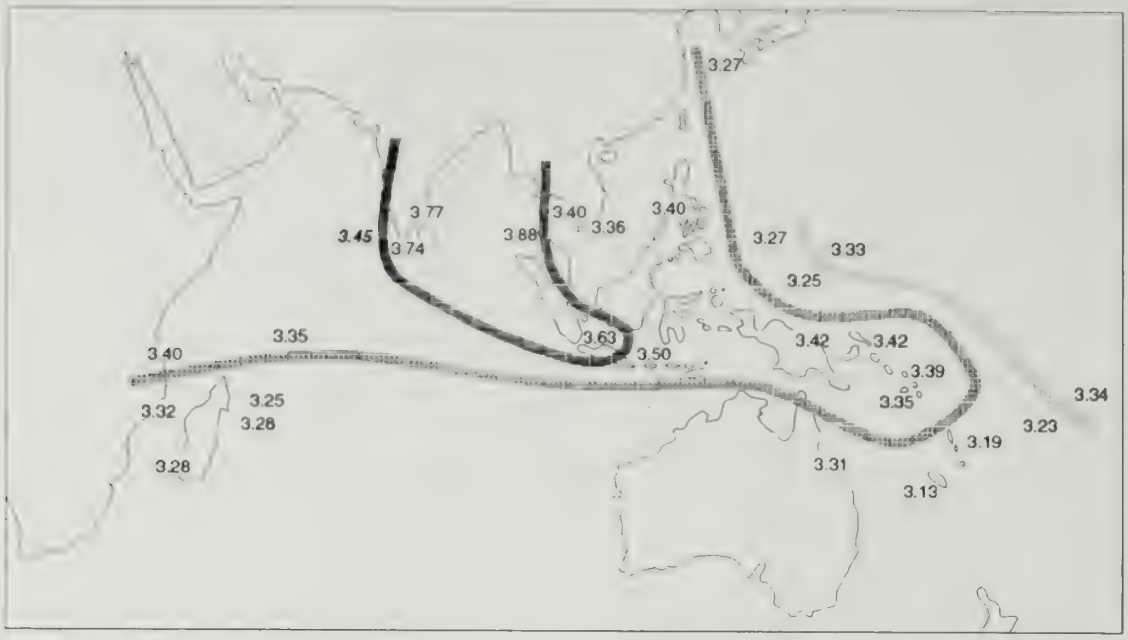


Fig. 21. ***O. miniacea s.l.*** **Clinal variation of aperture colour**. Figures are longitudes East (in degrees). For definition of colour classes, see text § 4.6.3. Black bars contain over 85% of each sample. **a.** Tanzania (N = 12). **b**. Mozambique (N = 14). **c**. Madagascar (N = 37). **d**. Mauritius (N = 50). **e**. South India (N = 49). **f**. Sri Lanka (N = 18). **g**. Thailand (N = 40). **h**. Vietnam (n = 12). **i**. Bali (N = 14). **j**. Taiwan (N = 10). **k**. Philippines (N = 80). **l**. Okinawa (N = 10). **m**. Papua New Guinea (N = 18). **n**. Carolines (N = 12). **o**. Queensland (N = 48). **p**. Solomon Is. (N = 32). **q**. New Caledonia (N=60). **r**. Kwajalein (N = 23). **s**. Fiji (N = 13).

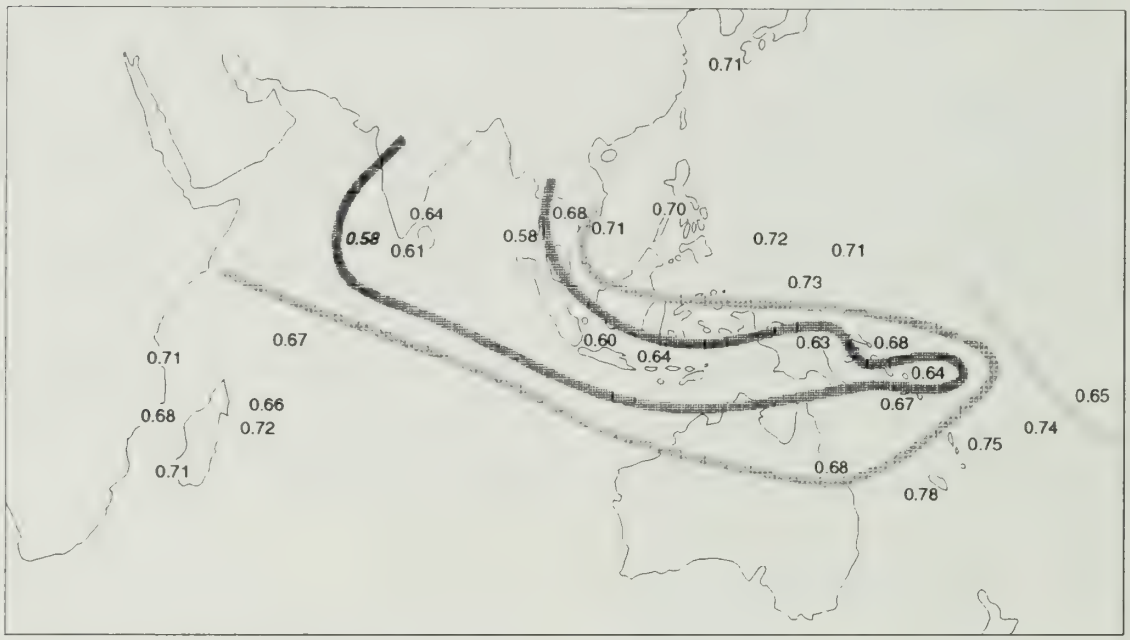
against longitude. For reproducibility, the reference colour classes have been defined by their content in red (R), green (G) and blue (B). Bluish: R 89%, G 96%, B 100%; Bluish grey: R 83.5%, G 88%, B: 91%; Bluish white: R 94.5%, G 100%, B 100%; Dirty white: R 95.7%, G 95.7%, B 95.7%;White: R 100%, G 100%, B 100%; Creamy white: R 100%, G 96.5%, B 100%; Cream: R 100%, G 89.5%, B 69.5%; Pale beige: R 100%, G 82.7%, B 62.7%; Beige: R 92.1%, G 67.5%, B 47.5%; Beige orange: R 93.7%, G 51%, B 34.5%; Pale orange: R 100%, G 62.4%, B 15.3%; Orange: R 100%, G 47%, B 0%; Red orange: R 100%, G 29%, B 5.1%.

Orange apertures are the rule in the Pacific, whitish apertures are standard in the Western and Central Indian Ocean; intermediate hues (and frequent intrapopulation heterogeneity) are seen in the central part of the distribution area (India, Sri Lanka, West Thailand, Indonesia, etc.). This character is unlikely to be of direct adaptative significance, as it cannot be seen as long as the animal is alive. The observed variation is far more likely to be of genetic origin.

4.7.4. Further confirmation comes from the observation of a clinal variation in protoconch characters. Mean values observed for NW (and rough isophene lines) are reported on the distribution area (Map 1). Ranges of values for neighbouring populations do frequently overlap and the figures indicate only tendencies of the mean values. It will be seen that mean values decrease regularly with distance from a point located roughly in the Andaman Sea. Mean values observed for LPRO (and isophene lines) are reported on the distribution in Map 2. In this figure also, ranges of values for neighbouring populations do frequently overlap and the figure indicates only tendencies of the mean values.



Map 1. *O. miniacea s.l.*, variation of NW. Mean values (see text § 4.7.4). Isophene lines for arbitrary values 3.30 and 3.60. The value for *O. ponderosa* is in italics.



Map 2. *O. miniacea s.l.*, variation of LPRO. Mean values (see text § 4.7.4). The value for *O. ponderosa* is in italics. Isophene lines for arbitrary values 0.65 and 0.70.

The parallelism between these two graphs is rather striking. The characters LPRO and NW are geometrically independent variables (see Fig. 1), but appear to be biologically related in the genus *Oliva* (TURSCH, 1988). Clinal variation within a group of populations is of course a very strong argument for their conspecificity. Here again, the variations of the protoconch are more likely to be genetic than adaptative (see TURSCH, 1994). Maps 1 and 2 could possibly indicate that *Oliva miniacea s.l.* originated somewhere in the North of the Indo-Malayan arc.

4.8. Problems of rank.

It follows from Table 1 that *O. concinna* Marrat, 1870, *O. hirasei* Kira, 1959 and *O. sericea* (Röding, 1798) all obviously constitute separate species. The same goes for phenon *MS* (*O. mascarena* n. sp., described here under). All are broadly sympatric with populations of *Oliva miniacea s.l.*

Within the highly variable species *Oliva miniacea s.l.*, all the specimens from India, Sri Lanka and the Maldives that we have examined correspond to *O. flammeacolor*. All the populations of East Africa, Madagascar, Reunion, Mauritius and the Seychelles that we have studied correspond to *O. tremulina*. These two groups of populations clearly stand out in general aspect, are characteristic of given geographic regions and deserve subspecific rank: *Oliva miniacea flammeacolor* Petuch & Sargent, 1986 and *Oliva miniacea tremulina* Lamarck, 1811. Intermediate forms do occur, for Instance in Thailand and in Indonesia, as fully expected for subspecies.

O. ponderosa Duclos, 1840 (restricted to the Maldives region) is readily separated by shell measurements from all Indian Ocean shells, but is quite close to some *O. miniacea* populations from the South Pacific. On shell morphological grounds only, it could be just another local phenon of *O. miniacea*. We prefer to consider it a full species because it is broadly sympatric with *O. miniacea flammeacolor* Petuch & Sargent, 1986 (and two subspecies cannot co-occur, by definition).

The same reasoning applies to *O. atalina* Duclos, 1835 (from Cargados and Mauritius), also readily separated from all other Indian Ocean shells, but very close in shell morphology to some *O. miniacea* populations from the South Pacific. It is broadly sympatric with *Oliva miniacea tremulina* Lamarck, 1811 and should therefore be considered as a full species.

5. CONCLUSIONS

The above analysis of both morphometric and distribution data has led us to separate the following 7 species:

- *O. atalina* Duclos, 1835,
- *O. concinna* Marrat, 1870,
- *O. hirasei* Kira, 1959,
- *O. miniacea* (Röding, 1798),
  with two subspecies:
  - *O. miniacea flammeacolor* Petuch & Sargent, 1986,
  - *O. miniacea tremulina* Lamarck, 1811,
- *O. ponderosa* Duclos, 1840,
- *O. sericea* (Röding, 1798),
- Another species, the provisional phenon *MS* (*O. mascarena* n. sp., described here under).

6. SYSTEMATICS

6.1. Affinities.

A close affinity most probably exists between all the taxa considered here. Their shells are quite similar and not readily separable by the shape of the spire and that of the body whorl, both very variable. Most have subchannel marks on the spire. Their suprafasciolar band is divided in two spiral colour zones, the upper one nearly always of lighter colour (excepted in dark specimens), due to additional enamel. In all taxa (with the exception of *O. ponderosa*), the body whorl often has a colour pattern with two prominent darker bands, one near the shoulder and one near the middle of the body whorl. All the shells considered here also have very similar protoconchs and early whorls (see Plate 6). Only *O. sericea* is characterized by its fused early teleoconch whorls (Plate 6, Figs. 9-10). These two figures also illustrate the great intraspecific variability of the angle of the spire, observed in all the species studied here.

In addition to resemblance in shell morphology, the species we had the opportunity of observing alive (*O. concinna, O. miniacea, O. sericea*) share similarities in the coloration of the animal (pattern formed of large, isolated dark spots). The same pattern is reported for *O. ponderosa* by DUCLOS (1840, Pl. 33, Fig. 8).

Most of the taxa reviewed here are familiar, sometimes under another name. All have been placed in the subgenus *Miniaceoliva* Petuch & Sargent, 1986, also including some species that might be quite unrelated. Awaiting objective data on the limits of the subgenus *Miniaceoliva*, we will (for the time) refrain from using this category.

6.2. Characters.

It must be stressed that, in the genus *Oliva*, there is a fundamental difference of nature between classifications obtained by morphometric methods and classifications based upon ornamentation patterns. As exemplified here above, morphometrics lead to **monothetic taxa,** in which the possession of a unique set of features is both sufficient and necessary for membership. In contrast, the classical "visual" approach (based upon characters as unstable as spire height, colours and colour patterns) generally leads to **polythetic taxa**. In such taxa, organisms that have the greatest number of shared

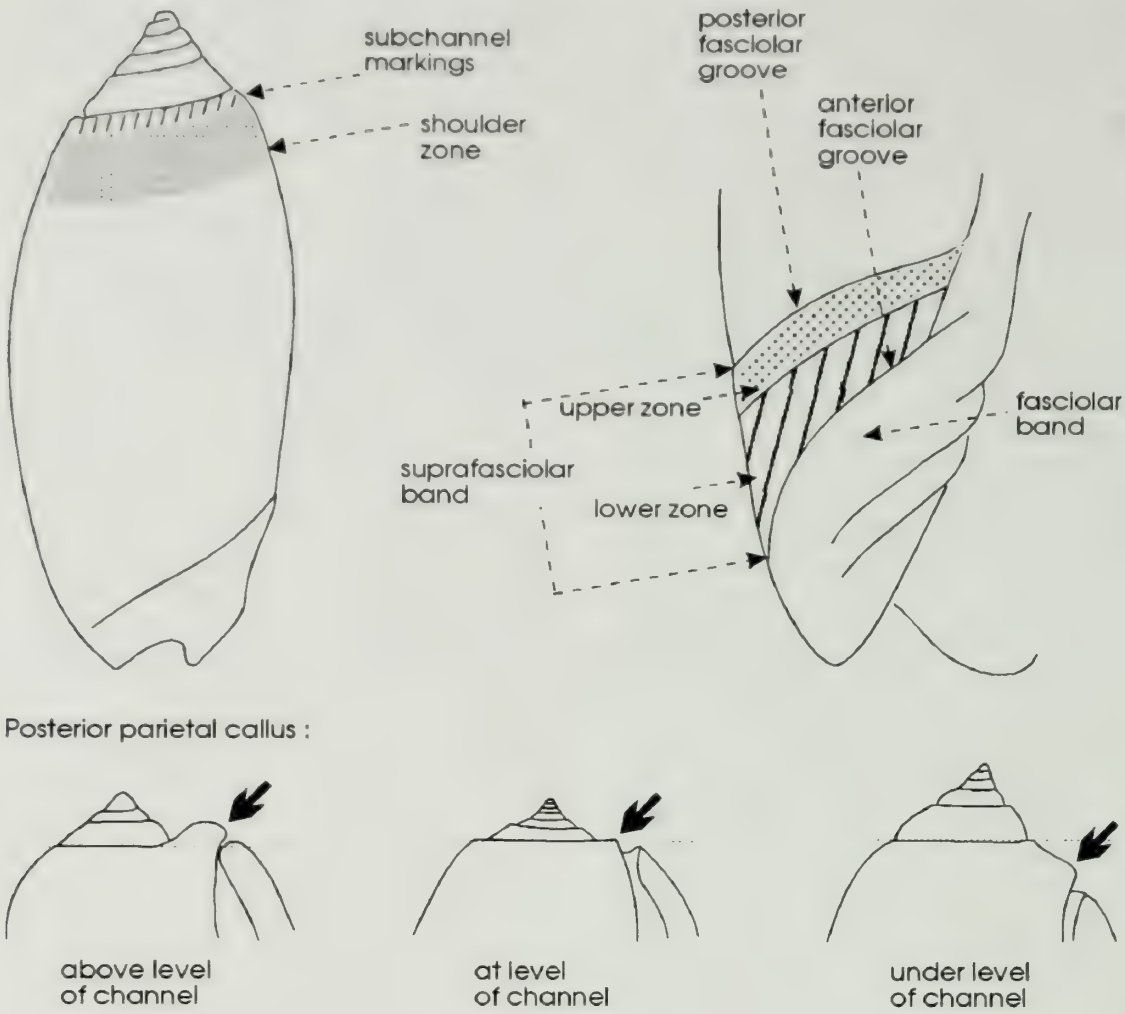


Fig. 22. Descriptive terms for shell.

characters are placed together, but no single character is either necessary or sufficient for group membership (see SNEATH & SOKAL, 1973; PANCHEN, 1992).

In deference to conchological tradition, the following "Diagnosis" paragraphs are largely based upon shell ornamentation, which is notoriously variable in the genus *Oliva*. All characters common to the genus (shell smooth, shiny, etc.) shall be omitted and only features with some discrimination power are reported. Preference has been given to details possessing probably very little or no adaptative value. As just stated here above, very few (if any) of these traits, taken one by one, will allow secure identification of an individual specimen. The probability for achieving this will be much increased by observing the simultaneous presence of such features.

Morphometrics allowed the delimitation of objective, natural taxa. This exploratory task being accomplished, detailed measurements are generally not indispensable any more for identification of individual specimens. *Oliva* species, although highly variable, have nevertheless limited "*répertoires*". Familiarity with the limits of intraspecific variation should allow rapid identification of most (but not all) specimens.

6.3. Notes.

Some descriptive terms used here for the shell (upper and lower zones of the suprafasciolar band, shoulder zone, subchannel markings, the position of the posterior parietal callus relative to the filament channel of the penultimate whorl) are made explicit in Fig. 22. For the use of the term "filament channel"

instead of "suture" see VAN OSSELAER & TURSCH (1994).

In the diagnoses, (+++) stands for "*nearly always*", (++) for "*in most cases*" and (+) for "*sometimes*". The abbreviation "*q.v.*" (*quod vide*) means "*see under that name*".

The list of localities in the paragraphs "Distribution" is not exhaustive and reports only material seen by us and having reliable data.

In the following section, the names of very frequently cited authors will be abbreviated, to save on space. So, B. & B. stands for BURCH & BURCH, P. & S. for PETUCH & SARGENT, W. & A. for WAGNER & ABBOTT, Z. & P. for ZEIGLER & PORRECA. To avoid confusion, "Pl." and "fig(s)." refer to plates and figures in cited works, while "PL." and "FIG(S)." refer to illustrations in the present paper.

6.4. The species.

Family **OLIVIDAE** Latreille, 1825
Subfamily OLIVINAE Latreille, 1825
Genus *Oliva* Bruguière, 1789

Oliva atalina Duclos, 1835.

Oliva atalina Duclos, 1835: Pl. 10, Figs. 9 and 10.

Oliva quersolina Duclos, 1835: Pl. 10, Figs. 7 and 8.
Oliva stainforthi Reeve, 1850: sp. 40, Pl. 19, Fig. 40.
Oliva soverbii Marrat, 1870: 13, sp. 61.
Oliva sowerbyi Marrat, 1870: 13, sp. 61, Figs. 114 and 115.
Oliva fulva Marrat, 1871: 42, sp. n° 222, Fig. 471.

TYPE MATERIAL.

Oliva atalina Duclos, 1835: 3 syntypes at MNHN and 3 specimens in the Duclos collection at the Clermond-Ferrand Museum. One syntypes figured PL. 1, FIG. 2.
Oliva fulva Marrat, 1871: holotype at MCM, figured PL. 1, FIG. 3.
Oliva quersolina Duclos, 1835: 3 syntypes at MNHN. One syntype figured PL. 1, FIG. 1.
Oliva sowerbyi Marrat, 1870: 2 syntypes at MCM. One syntype figured PL. 1, FIG. 4.
Oliva stainforthi Reeve, 1850: 2 syntypes n° 1892.9.24.13-14 at BM(NH). One syntype figured PL. 1, FIG. 5.

SYNONYMY.

That *O. atalina* Duclos, 1835 constitutes a distinct species is demonstrated here above, in Section 4.

The following names are synonyms:

O. quersolina Duclos, 1835 was *O. episcopalis* Lamarck, 1811 for B. & B. (1960); *O. olorinella* Duclos, 1835 for W. & A. (1967) and (strangely enough) *O. reticularis* Lamarck, 1811 for Z. & P. (1969) and P. & S. (1986). Careful examination of the type material leaves no doubt at all that *O. quersolina* Duclos, 1835 is a **subjective synonym** of *O. atalina* Duclos, 1835.

O. stainforthi Reeve, 1850 was *O. lentiginosa* Reeve, 1850 (a colour form of *O. esiodina* Duclos, 1844, see TURSCH & GREIFENEDER, 1989a) for W. & A. (1967). It was *O. duclosi* Reeve, 1850 (another colour form of *O. esiodina* Duclos, 1844, see TURSCH & GREIFENEDER, 1989a) for Z. & P. (1969) and P. & S. (1986). *O. duclosi* Reeve, 1850 form *stainforthi* ; Petuch & Sargent (not Reeve, 1850), 1986 (Pl. 1, Figs. 11, 12) does not even resemble the type material of *O. stainforthi* Reeve (and is clearly the light colour form of *O. esiodina* Duclos, 1844). *O. stainforthii* Reeve (a misspelling) was *O. duclosi* var. *lentiginosa* for B. & B. (1960). One of the two syntypes of *O. stainforthi* (see PL. 1, FIG. 5) is an especially small, "fat", rarely seen form of *O. atalina*. Its identity is evidenced by its position in the scatter diagrams (FIGS. 13, 14, 15 and 17). *O. stainforthi* Reeve, 1850 is therefore a **subjective junior synonym** of *O. atalina* Duclos, 1835.

O. sowerbyi Marrat, 1870 was reported (caption of Marrat's Figs. 114, 115) as originating from Jamaica (an obvious error). This might explain why it has been considered as being *O. reticularis* Lamarck, 1811 (or a color form of this species) by B. & B. (1960), Z. & P. (1969), W. & A. (1967) and P. & S. (1986). It was correctly recognised as being *O. stainforthi* Reeve, 1850 (see here above) by TOMLIN (in FORD, 1953). *O. reticularis* colour form *sowerbyi* ; Petuch & Sargent (not Marrat, 1870), 1986 (Pl. 27, Figs. 10,11) does not at all resemble the type material of *O. sowerbyi* Marrat (and clearly belongs to the American *O. reticularis-fulgurator* group). *O. soverbyi* Marrat, 1870 (Thesaurus, sp. 61, p. 13) is a misprint, corrected in the caption for Pl. 8, Figs. 114-115 as well as in the Index. *O. sowerbyi* Anton, 1839 is a small fossil from the Paris region. It is probably an *Ancilla*, as it was described (ANTON, 1839: 102) under *hiatula*. "*Oliva*" *sowerbyi* Ducros de Saint Germain, 1857 is not an *Oliva* but an *Olivella*. Careful examination of the type material leaves no doubt that *O. sowerbyi* Marrat, 1870 is a **subjective junior synonym** of *O. atalina* Duclos, 1835.

O. fulva Marrat, 1871 was *O. oliva* (L., 1758) by B. & B .(1960) for W. & A. (1967) and a colour form of *O. leucostoma* Duclos, 1840 for P. & S. (1986). *O. fulva* ; Petuch & Sargent (not Marrat, 1871), 1986 (*Atlas*: 162, Pl. 33, Figs. 3, 4) does not even resemble the type and is probably a melanistic *O. elegans* Lam. SOWERBY (Marrat's editor) commented on *O. fulva* (in *Thesaurus*: 42): "This species is allied to a difficult series of Olives viz. *O. atalina*, *O. quersolina*, etc. They may all prove varieties of a common type when the variations are better understood". Study of the sub-adult, worn and discoloured holotype (figured in PL. 1, FIG. 3) established that *O. fulva* Marrat, 1871 is a **subjective junior synonym** of *O. atalina* Duclos, 1835, of which it has the characteristic "double dots" colour pattern (see Diagnosis, here below).

The following names have been mistakenly considered as synonyms:

O. caerulea (Röding, 1798). *O. atalina* Duclos, 1835 was this species for W. & A. (1967). This is not the case, as demonstrated here above (§ 4.5.6 and FIG. 18), but the confusion is understandable. The two species are indeed rather similar in general aspect, except for the typical blue colour of the aperture of *O. caerulea* (Röding, 1798), a **valid species** (see GREIFENEDER, DUCHAMPS & TURSCH, 1995).

O. episcopalis Lamarck, 1811. *O. atalina* Duclos, 1835 was this species for B. & B. (1960) and Z. & P. (1969). *O. episcopalis* Lamarck, 1811 (see GREIFENEDER, DUCHAMPS & TURSCH, 1995) is a **subjective synonym** of *O. caerulea* (Röding, 1798), discussed in the previous paragraph.

DIAGNOSIS.

In addition to the numerical discriminants reported in Table 1, the following features are useful for recognising *O. atalina*:

Shell up to about 55 mm. Aperture ivory (+++) to faint violet (+). Columella same colour (whitish) as body whorl (+++).

Spire. Profile of spire whorls: variable. In old specimens, posterior parietal callus of variable height in relation to channel of previous whorl.

Body whorl. Subchannel markings: 13 to 18 faint purple axial thin strokes. Background colour ivory white. Shoulder zone: thin band with much reduced pattern. Body whorl colour pattern: characteristic irregular vertical arrangement of elements formed by minute orange dots immediately followed by diffuse bluish spots (+++). In some cases these elements coalesce into vertical zigzag lines. Darker spiral bands very faint, often consisting in a few, isolated dark spots (+++). Overlay with dark layers not observed.

Suprafasciolar band: pattern in upper zone lacking or very reduced; lower zone with repeating blotches of same colour as body whorl pattern (PL. 5, FIGS. 1, 2).

DISTRIBUTION.

Cargados Carajos, Mauritius.

Oliva concinna Marrat, 1870.

Oliva concinna Marrat, 1870: p. 13, Pl. 7, Figs. 100, 101.

Oliva tremulina ; Dautzenberg (not Lamarck, 1811), 1927 var. *chrysoides* Dautzenberg, 1927: 139.

Oliva tremulina ; Zeigler (not Lamarck, 1811), forma *oldi* Zeigler, 1969: 14-19.

Oliva fumosa ; Petuch & Sargent (not Marrat, 1871), 1986: p. 90, Pl. 10, Figs. 1, 2.

Oliva fumosa ; Petuch & Sargent (not Marrat, 1871) *kremerorum* Petuch & Sargent, 1986: 91, Pl. 10, Figs. 3, 4.

TYPE MATERIAL.

O. concinna Marrat, 1870. The type lot (at MCM) consists of two specimens of different species. Of the two figured syntypes, (specimen n° 101, H: 44.2, D: 17.8 mm, figured on PL. 3, FIG. 4, is obviously *O. miniacea tremulina* Lamarck, 1811 (*q.v.*). The other syntype (n° 100, also H: 44.2, D: 17.8 mm, from New Caledonia, figured on PL. 1, FIG. 7, belongs to another species, not yet described at the time. It is here selected as the **lectotype** of *O. concinna* Marrat, 1870.

O. tremulina forma *oldi* Zeigler, 1969. Holotype at AMNH n° 147750, figured PL. 1, FIG. 9. Paratype n° C111456 at AMS.

O. (Miniaceoliva) fumosa kremerorum Petuch & Sargent, 1986. Holotype at USNM (n° 841460), figured PL. 1, FIG. 8. Paratype n° C153453 at AMS.

NOTE. *O. concinna* has been introduced here only as an outgroup for the delimitation of the "*O. miniacea* complex" (see Introduction). The relationships of *O. concinna* Marrat, 1870 with *O. irisans* Lamarck, 1811 and *O. ornata* Marrat, 1867 (both unlikely to be confused with forms of the "*O. miniacea* complex") will be examined elsewhere.

SYNONYMY.

The following names are synonyms:

O. tremulina var. ***chrysoides*** Dautzenberg, 1927 was a form of *O. tremulina* Lamarck, 1811 for B. & B. (1960, 1967), Z. & P. (1969) and W. & A. (1967). It was a colour form of *O. fumosa* ; Petuch & Sargent (not Marrat, 1871), 1986 *concinna* Marrat, 1870 for P. & S. (1986). Study of the material in the Dautzenberg collection (now at IRSNB) established that *O. tremulina* ; Dautzenberg (not Lamarck, 1811), 1927 var. *chrysoides* Dautzenberg, 1927 is a **colour form** of *O. concinna* Marrat, 1870. A specimen from the Dautzenberg collection is figured PL. 1, FIG. 6.

O. tremulina forma ***oldi*** Zeigler, 1969. Study of the holotype (from the Solomon Islands, figured PL. 1, FIG. 9) shows that *O. tremulina* ; Zeigler (not Lamarck, 1811), 1969 forma *oldi* Zeigler, 1969 is a dark-patterned **colour form** of *O. concinna* Marrat, 1870, a form linked to the type by many intergrades. This was a form of *O. tremulina* Lamarck, 1811 for Z. & P. (1969) and W. & A. (1967) to be. It was considered a colour form of *O. fumosa*; Petuch & Sargent (not Marrat, 1871) *concinna* Marrat, 1870 (see here under) for P. & S. (1986).

O. fumosa kremerorum Petuch & Sargent, 1986. Study of the holotype established that *O. fumosa* ; Petuch & Sargent (not Marrat, 1871), 1986 *kremerorum* Petuch & Sargent, 1986 is a **form** of *O. concinna* Marrat, 1870 found in South India and Sri Lanka. Nearly identical specimens are commonly found in Melanesia.

The following names have been mistakenly considered as synonyms or constitute errors in identification:

O. tremulina Lamarck, 1811. *O. concinna* Marrat, 1870 was a synonym of this name (*q.v.*) for TOMLIN (in FORD, 1953), B. & B. (1967), Z. & P. (1969) and W. & A. (1967). This is understandable, due to the heterogeneity of the type lot of *O. concinna* (see Type Material).

O. pica Lamarck, 1811 was a possible synonym of *O. concinna* Marrat, 1870 for W. & A. (1967). *O. pica* ; Johnson (not Lamarck, 1811), 1928 was a possible synonym of *O. concinna* Marrat, 1870 for B. & B. (1967). *O. pica* Lamarck, 1811 is a **nomen dubium** (see GREIFENEDER, DUCHAMPS & TURSCH, 1995).

O. zeilanica Lamarck, 1811. *O. concinna* Marrat, 1870 was placed by KÜSTER (in WEINKAUFF, 1878) in the synonymy of this name, which is also a **nomen dubium** (see GREIFENEDER, DUCHAMPS & TURSCH, 1995).

O. tenebrosa Marrat, 1870 was a synonym of *O. concinna* Marrat, 1870 for W. & A., 1967. The holotype (figured PL. 3, FIG. 5) is just a dark specimen of *O. miniacea tremulina* Lamarck, 1811 (*q.v.*).

O. fumosa Marrat, 1871. P. & S. (1986) considered *O. concinna* Marrat, 1870 to be a subspecies of this taxon. *O. fumosa* ; Petuch & Sargent (not Marrat, 1871), 1986, Pl. 89, Figs. 1, 2 is indeed *O. concinna* Marrat, 1870. But the holotype of *O. fumosa* Marrat, 1871 (figured PL. 3, FIG. 3) is undoubtedly *O. miniacea tremulina* Lamarck, 1811 (*q.v.*). *O. fumosa* ; Petuch & Sargent (not Marrat, 1871), 1986 *kremerorum* Petuch & Sargent (not Marrat, 1871), 1986, discussed here above, is yet another facet of the same imbroglio.

DIAGNOSIS.

In addition to the numerical discriminants reported in Table 1, the following features are useful for recognising *O. concinna*:

Shell up to about 55 mm. Aperture whitish, not characteristic. Lower part of columella diffused with salmon or orange (+++), smoky brown in dark specimens.

Spire. Profile of spire whorls: variable, but not concave (++). In old specimens, posterior parietal callus mostly below, not above the filament channel of the previous whorl.

Body whorl. Subchannel markings: variable in number (can be absent) and aspect.

Background colour: ivory to light greyish beige. Shoulder zone: thin (3-5 mm) band generally without any pattern (+++). Body whorl pattern: most generally vertical zigzag of smoky grey to brown. Occasional specimens partly or completely overlaid with dark brown, black or orange.

Suprafasciolar band: upper zone with pattern lacking or very reduced, lower zone with many thin elements often coalescent in a continuous grey band (++) (PL. 5, FIGS. 9, 10). Width of fasciolar band very large (mean: 11.3% of lip length) (+++).

DISTRIBUTION.

Fiji, S. India, Indonesia (Bali), Sri Lanka, New Caledonia, Papua New Guinea, Philippines, Samoa, Solomons, W. Thailand, Vanuatu.

Oliva hirasei Kira, 1959.

Oliva hirasei Kira, 1959: Pl. 32, Fig. 8.

Oliva tremulina ; Zeigler & Porreca (not Lamarck, 1811) *fumosa* ; Zeigler & Porreca (not Marrat, 1871), 1969: Pl. 12, Fig. 8.

TYPE MATERIAL.

We are not aware of the existence of any type material.

SYNONYMY.

This is a distinctive shell, now unanimously recognized as a valid species, and most specimens are correctly identified. Two representative specimens are figured PL. 1, FIGS. 10, 11. B. & B. (1960) listed *O. hirasei* Kira, 1959 as a possible synonym of *O. tremulina* Lamarck, 1811.

Specimens of other species have sometimes been mistaken for this species. For instance, *Oliva tremulina* ; Zeigler & Porreca (not Lamarck, 1811) *fumosa* ; Zeigler & Porreca (not Marrat, 1871), 1969: Pl. 12, Fig. 8 is a typical *O. hirasei* Kira, 1959.

DIAGNOSIS.

In addition to the discriminants reported in Table 1, the following features are useful for recognising *O. hirasei*:

Shell up to about 60 mm. Aperture dirty white (+++). Lower tip of columella with smoky-grey diffuse blotch (+++). In old specimens posterior parietal callus variable, sometimes reaching or even surpassing level of apex.

Spire: no pattern at all (+++) except for occasional subchannel marks. Profile of spire whorls: not convex (++).

Body whorl. Subchannel markings: variable small elements, often coalescent into a thin dark line along the external rim of the channel (++). Background colour: light beige to apricot. Shoulder zone: broad band generally devoid of pattern (+++). Body whorl pattern: brown, most generally large vertical zigzag patterns. Most often very bold streaks just under shoulder zone. Overlay with dark layers not observed.

Suprafasciolar band: upper zone with pattern lacking or very reduced; lower zone with many thin elements often coalescent in a continuous grey band (++) (PL. 5, FIGS. 11, 12).

DISTRIBUTION.

Japan, New Caledonia, Papua New Guinea, Philippines, Solomons, Taiwan.

REMARKS.

This species is referred to as *hirasei* "Kuroda & Habe, 1952" Kira, 1959 (WAGNER & ABBOTT, 1967) or *hirasei* Kira, 1959 (PETUCH & SARGENT, 1986). According to Z. & P. (1969: 71), Kuroda & Habe proposed this new name in 1952, based on a figure of HIRASE (1909: 3, Pl. 4, Fig. 26) in *The Conchological Magazine*, a short-lived publication that appeared in Japan early in the century. Apparently, there is no written description of the shell by KURODA and HABE (1952). The species was then described by KIRA (1959).

Oliva mascarena n. sp.

Oliva olympiadina ; Reeve (not Duclos, 1835) 1850: Pl. 3, Figs. 5a, 5b, 5d, 5e.

Oliva ponderosa ; Zeigler & Porreca (not Duclos, 1840) 1969: Pl. 12, Fig. 9.

Oliva tremulina olympiadina ; Zeigler & Porreca (not *tremulina* Lamarck, 1811, not *olympiadina* Duclos, 1835) 1969: Pl. 12, Fig. 6.

Oliva olympiadina ; Kaicher (not Duclos, 1840), 1989. Card n° 5513.

Oliva pica ; Petuch & Sargent (not Lamarck, 1811) 1986: Pl. 13, Figs. 7, 8.

Oliva pica colour form *olympiadina* ; Petuch & Sargent (not *pica* Lamarck, 1811, not *olympiadina* Duclos, 1835) 1986: Pl. 13, Figs. 9, 10.

TYPE MATERIAL.

Holotype (PL. 4, FIG. 1) in BM(NH) n° 1953.3.4.203 (H: 75.1 mm; D: 35.1 mm), collected at Aldabra, June 1938. From Winckworth collection, with old label "*O. pica*".

Paratype 1 (PL. 4, FIG. 2) in BM(NH) n° 1953.3.4.204 (H: 68.5 mm; D: 31.0 mm), collected at Aldabra, June 1938. From Winckworth collection, with old label "*O. pica*".

Paratype 2 (PL. 4, FIG. 3) in IRSNB, (H: 71.5 mm; D: 32.0 mm) Dautzenberg collection, "probably from Mauritius".

Paratype 3 (PL. 4, FIG. 4) in MNHN, (H: 67.8; D: 32.0 mm), ex coll. D. Greifeneder n° DG-3921a, Seychelles.

Paratype 4 (PL. 4, FIG. 5) in D. Greifeneder coll., n° DG-3076, (H: 59.8 mm; D: 27.3 mm), Peros Banhos, Chagos Archipelago.

Paratype 5 (PL. 4, FIG. 6) in B. Tursch coll., n° BT-4370, (H: 65.6 mm; D: 29.5 mm), dredged 15 m, Beau Vallon, Seychelles, 1973.

SYNONYMY.

That *O. mascarena* n. sp. constitutes a distinct species has been demonstrated here above (in Section 4). If recognised once, this shell will later be identified at a glance. The existence and the variation range of this rather obvious species were already recognised in 1850 by Reeve, on the basis of a large series of specimens (about 200) from Mauritius. Reeve unfortunately thought that the species was already described and even selected a fine specimen (BMNH n° 1984149, from the Cuming collection) to illustrate what he believed to be *O. olympiadina* Duclos, 1835 (the identity of *O. olympiadina* is

now clear: the two figured syntypes are colour forms of *O. miniacea tremulina* Lamarck, 1811, *q.v.*).

Ever since Reeve's days, students were apparently convinced that such a large, striking species ***must*** already have been named (which is not the case). Specimens, present in large numbers in many old collections, have thus been invariably shoehorned into many of the taxa created for shells of the Western region of the Indian Ocean. Even in one of the world's most prestigious Museums, specimens of this species bear the labels *O. miniacea, O. olympiadina, O. pica, O. ponderosa, O. sericea* and *O. tremulina.*

The rather frequent use of the name *O. pica* Lamarck, 1811 deserves some comment. This is a nomen dubium (see GREIFENEDER, DUCHAMPS & TURSCH, 1995). In any case, the original description "*Sur une couleur brune ou d'un fauve très-rembruni, cette olive presente des taches d'un beau blanc, irrégulières, et dont plusieurs sont trigones ou deltoïdes*" does not apply to any of the several hundred specimens of *O. mascarena* n. sp. that we have examined.

O. ponderosa ; Zeigler & Porreca (not Duclos, 1840), 1969, *O. tremulina* ; Zeigler & Porreca (not Lamarck, 1811) *olympiadina*; Zeigler & Porreca (not Duclos, 1835), 1969, *O. pica* ; Petuch & Sargent (not Lamarck, 1811), 1986, *O. pica* ; Petuch & Sargent (not Lamarck, 1811), 1986 colour form *olympiadina* ; Petuch & Sargent (not Duclos, 1835), 1986 are some other examples (amongst more) of misidentification of *O. mascarena* n. sp. *O. olympiadina* ; Kaicher (not Duclos, 1840), 1989 is also this species.

DESCRIPTION.

GENERAL ASPECT. The rather cylindrical shell is of medium to large size, (40 to probably 80 mm), with an average ratio of diameter (D) to lip length (L) of D/L = 0.49. The spire is flat-conical to onion-shaped. The average height of the spire is 7% of the total shell length (H). In adult shells, the posterior parietal callus reaches (or more often protrudes above) the level of the channel of the previous whorl. The protoconch and the width of the filament channel are similar to those of the other large *Oliva* species of the Indian Ocean, such as *O. miniacea tremulina* and *O. ponderosa.* The columellar plaits are flat and smooth in adult shells, whereas 20 distinct plaits were counted on an immature specimen. The upper margin of the suprafasciolarian band meets the columella outline at an average relative height of 0.49 of the lip length (L). The uppermost callus zone of the fasciolar band has a mean breadth of 8.3% of the lip length (L). This zone is thus generally broader than in *O. miniacea tremulina* (mean 5.6%) or in *O. miniacea* (mean 6.0%). In large, adult specimens the inner part of the lip is thickened over a large stretch, in which the lip runs straight, parallel to the shell axis. The siphonal notch is mostly more oblique than in *O. miniacea tremulina.* For an equal size, the shell of *O. mascarena* n. sp. is generally much heavier than *O. miniacea tremulina* or *O. miniacea*, but lighter than *O. atalina* and *O. ponderosa.*

COLOUR PATTERN. The ground colour of all parts of the shell is ivory white or brilliant white, the latter mainly in populations from Aldabra, the Seychelles or Tanzania. The columella and the fasciolar band can show a touch of cream. Prevalent blurred and diffuse pattern elements are purplish-grey, the additional blotches are brown, dark brown or even black. The whorls of the spire show few tangential strokes or chevrons. The subchannel rim has 9 to 17 faint oblique chevrons. Then follows a small zone with a reduced density of pattern elements. On the body whorl, the blurred purplish-grey pattern elements (mostly degenerated chevrons and strokes) are arranged more or less axially. There are two darker spiral bands, which are mainly formed by additional dark blotches. Occasionally, the shells are partly overlaid with dark chocolate brown. In the upper zone of the suprafasciolarian band, the pattern density is reduced. The lower part of the same band is decorated with 6 to 12 dark blotches or oblique strokes, forming in some cases a "tiger pattern".

NUMERICAL VALUES.

Some morphometric data of *O. mascarena* n. sp. are reported in Table 2. None of these values, if taken alone, will ensure secure identification. Appropriate combinations of these data will do so, as shown in Section 4 (Delimitation of objective phena).

One should note the very high values of the coefficient of variability (CV) for all data involving (H-L), expressing the relative height of the spire. This feature, heavily emphasized in nearly all classical descriptions of *Oliva* species, is nearly useless, being possibly the most variable quantitative character in all the taxa we have examined.

	mean	CV	min.	max.
Protoconch (*N*=7)				
LPRO (mm)	0.54	4.92	0.51	0.59
LPRO-SPRO (mm)	0.37	4.70	0.34	0.4
MPRO (mm)	0.34	6.22	0.31	0.36
MPRO/NW	0.09	7.35	0.08	0.11
NW	3.56	2.74	3.45	3.75
PAT17 mm)	0.67	7.04	0.6	0.72
PAT18 (mm)	1.13	2.51	1.09	1.16
RES5 (mm)	1.47	3.09	1.38	1.53
SPRO (mm)	0.18	9.67	0.15	0.19
Teleoconch (*N*=17)				
(D-X)/D	0.28	6.09	0.24	0.30
(H-L)/D	0.21	23.14	0.13	0.30
(H-L)/H	0.10	23.17	0.06	0.15
(H-L)/R	0.50	20.92	0.32	0.70
D/H	0.46	3.21	0.42	0.48
D/PNW	4.77	9.85	4.08	5.56
F/H	0.43	3.55	0.40	0.46
F/L	0.49	3.26	0.44	0.50
F/PNW	4.51	11.28	3.64	5.41
FG/F	1.13	1.04	1.20	3.61
FG/H	0.49	2.27	0.46	0.51
H/PNW	10.47	9.07	8.98	12.16
L/H	0.91	2.19	0.87	0.94
L/PNW	9.49	10.08	8.20	11.23
LW/H	0.93	1.54	0.91	0.96
LW/PNW	9.78	9.59	8.39	11.53
R/H	0.19	3.60	0.18	0.20
R/PNW	1.99	1.72	2.34	8.69
(100*SUT)/F	2.73	10.11	2.14	3.35
(100*SUT)/H	1.17	8.29	0.93	1.39
(100*SUT)/LW	1.26	8.87	0.96	1.49
(100*SUT)/PNW	12.28	11.02	9.82	14.73
X/H	0.33	2.96	0.31	0.35

Table 2. *Oliva mascarena*, n.sp: morphometric data. The meaning of the measurements is sketched in Fig. 1. CV is the coefficient of variability, it is equal to (100 x standard deviation)/mean (MAYR, 1969).

DIAGNOSIS.

In addition to the numerical discriminants reported in Table 1, the following features are useful for recognising *O. mascarena* n. sp.:

Shell up to about 80 mm. Aperture white (+++). Columella and fasciole white or creamy (+++).

Spire. Profile of spire whorls: variable. In mature and old specimens: posterior parietal callus always above the filament channel of the previous whorl (+++).

Body whorl. Subchannel markings: 9 to 17 oblique chevrons (pointed upwards) short purplish-grey elements. Background colour: ivory to pure brilliant white (+++). Shoulder zone: thin band with much reduced pattern (++). Body whorl pattern: blurred purplish-grey elements, mostly arranged axially. Darker spiral bands formed by additional dark brown to black blotches. Occasional specimens partly overlaid with chocolate brown.

Suprafasciolar band: upper zone with pattern lacking or very reduced; lower zone very close to *O. atalina*, but with dark dots more frequent (++) (see PL. 5, FIGS. 3, 4).

COMPARISONS.

O. mascarena n. sp. can be distinguished from:

- *O. atalina* by never having the "orange and blue double dots" pattern elements characteristic of this species (*q.v.*). Complete morphometric separation is shown in FIG. 16 (H/R *vs.* LW/PNW).
- *O. concinna* by lacking the suprafasciolar pattern and the columella tip coloration typical of this species (*q.v.*). Complete morphometric separation is given in FIG. 11 ((H-L)/L *vs.* L/PNW).
- *O. hirasei* by not possessing the broad, unadorned shoulder zone, the columella tip coloration and the bold streaks colour pattern typical of this species (*q.v.*). Complete morphometric separation is shown in FIG. 8 (H/PNW *vs.* PAT18) and FIG. 15 (LW/PNW *vs.* RES5).
- *O. miniacea miniacea* by lacking the bright orange to beige aperture colour, the columella colour, the suprafasciolar pattern typical of this species (*q.v.*) and by having a very different pattern. Complete morphometric separation is shown in FIG. 9 (NW/LPRO *vs.* H/F).
- *O. miniacea flammeacolor* by lacking the deep beige aperture colour, the suprafasciolar pattern typical of this species (*q.v.*) and by having a very different colour pattern on the body whorl. Complete morphometric separation is shown in FIG. 9 (NW/LPRO *vs.* H/F).
- *O. miniacea tremulina* by lacking the suprafasciolar pattern typical of this species (*q.v.*) and by having a very different colour pattern on the body whorl. Complete morphometric separation is shown in FIG. 9 (NW/LPRO *vs.* H/F).
- *O. ponderosa* by lacking the pale pink or orange aperture, the violet tinge on the fasciole margin typical of this species (*q.v.*) and by frequently having a pattern of dark blotches, nearly always lacking in *O. ponderosa*. Complete morphometric separation is shown in FIG. 9 (NW/LPRO *vs.* H/F).
- *O. sericea* by lacking the cream aperture, the very convex spire whorls, the fused postnuclear whorls, the suprafasciolar pattern typical of this species (*q.v.*) and by having a very different colour pattern on the body whorl. Complete morphometric separation is shown in FIG. 10 (PAT18 *vs.* RES5).

ETYMOLOGY.

Named after the Mascarene Islands.

DISTRIBUTION.

Aldabra, Cargados Carajos, Chagos (Peros Banhos), Mauritius (several localities), Mozambique (Nacala Bay), Reunion, Seychelles (Beau Vallon), Tanzania (Dar es Salaam). In Mauritius, *O. mascarena* is reported to be syntopic with *O. atalina* and *O. tremulina*.

Oliva miniacea (Röding, 1798).

Porphyria miniacea Röding, 1798: 32, sp. n° 391.

Porphyria miniata Link, 1807: 95.
Oliva porphyracea Perry, 1811: Pl. 41, Fig. 2.
Oliva erythrostoma Lamarck, 1811: 309, sp. n° 3.
Oliva aurantiaca Schumacher, 1817: 244.
Oliva masaris Duclos, 1835: 17, Pl. 20, Figs. 7-8 and Pl. 11, Fig. 9.
Oliva azemula Duclos, 1840: Pl. 14, Figs. 1, 2 (*pars*).
Oliva sylvia Duclos, 1845: 17, Pl. 14, Figs. 10-13.
Oliva magnifica Ducros de St. Germain, 1857: 30, Pl. 1, Fig. 4,a-d.
Oliva porphyritica Marrat, 1870: 12, Pl. 7, Figs. 105-110, sp. n° 55.
Oliva lamberti Jousseaume, 1884: 180.
Oliva sericea ; Johnson (not Röding, 1798) var. *miniacea* Johnson, 1910: 51.
Oliva sericea ; Johnson (not Röding, 1798) var. *marrati* Johnson, 1910: 51.
Oliva sericea ; Higgins (not Röding, 1798) var. *johnsoni* Higgins, 1919: 58.
Oliva erythrostoma var. *efasciata* Dautzenberg, 1927: 39.
Oliva erythrostoma var. *saturata* Dautzenberg, 1927: 39.
Oliva berti Terzer, 1986: 24.

TYPE MATERIAL.

Oliva azemula Duclos, 1840 : 6 syntypes at MNHN.
Oliva magnifica Ducros de St.Germain, 1857: holotype at MNHN.
Oliva lamberti Jousseaume, 1884: holotype at MNHN.
Oliva berti Terzer, 1986: holotype at Museum of Natural History, Genoa (not seen). Paratypes 1 and 2 in Terzer collection, Genoa.

SYNONYMY.

For the validity of the name *O. miniacea* (Röding, 1798), see TURSCH, DUCHAMPS & GREIFENEDER (1994).

The following names are synonyms:

O. miniata (Link, 1807) is an **objective junior synonym** of *O. miniacea* (Röding, 1798), both taxa being based upon the same illustrations (TURSCH, DUCHAMPS & GREIFENEDER, 1994). This is in agreement with W. & A. (1967) and P. & S. (1986).

O. porphyracea Perry, 1811 is a **subjective junior synonym** of *O. miniacea* (Röding, 1798) (see TURSCH, DUCHAMPS & GREIFENEDER, 1994), in agreement with B. & B. (1960). This was *O. porphyria* (L., 1758) for Z. & P. (1969), W. & A. (1967) and P. & S. (1986)

O. erythrostoma Lamarck, 1811. The original description is compatible with *O. miniacea* (Röding, 1798) and refers to the figures 476 and 477 of Martini, upon which this species is based. *Oliva erythrostoma* Lamarck is thus an **objective junior synonym** of *O. miniacea* (Röding, 1798). The species is clearly described and illustrated by DUCLOS (1840), who was familiar with Lamarck's specimens (see GREIFENEDER, DUCHAMPS & TURSCH, 1995). It was also *O. miniacea* (Röding, 1798) for B. & B. (1960), W. & A. (1967) and P. & S. (1986).

O. aurantiaca Schumacher, 1817. The laconic description consists only in "*Olive à bouche d'orange*" and a reference to figures 476 and 477 of Martini, previously used for *O. miniacea* (Röding, 1798). *O. aurantiaca* Schumacher, 1817 is therefore an **objective junior synonym** of *O. miniacea* (Röding, 1798), as for B. & B. (1960) and W. & A. (1967). Although there is no indication whatsoever, P. & S. (1986, p. 95) interpreted this as a colour form of *O. miniacea* (Röding, 1798).

O. masaris Duclos, 1835, for which no type specimens could be retrieved, has long been a puzzle. According to DUCROS (1857: 29) "*O. mazaris*, Duclos" (misspelling for *masaris*) is a discoloured shell of *O. erythrostoma* Lamarck. This contradicts the description of Duclos ("... onze specimens d'une *fraîcheur extrême*. ... L'ouverture, d'une extrême longueur, est carnicolore, *rien n' égale sa fraîcheur*. ...", italics ours). According to B. & B. (1967: 506) the figures of "*O. messaris* Duclos, 1835" (another misspelling for *masaris*) depict one large *O. tremulina* Lamarck, 1811, and one worn and discolored *O. miniacea* (Röding, 1798). The taxon was (in part) *O. miniacea* (Röding, 1798) for B. & B. (1960) and W. & A. (1967) and was a colour form of the same for P. & S., (1986). "*O. messaris* Marrat, 1871" cited as a synonym of *O. miniacea* (Röding, 1798) in P. & S. (1986: 94) is both a misspelling and a misquotation. The original description and figures of *O. masaris* Duclos, 1835 as well as the locality ("Habite les mers de la Chine") correspond to specimens from the intergradation zone between *O. miniacea s.s.* and *O. miniacea tremulina* (see § 4.7). It is thus best to consider *O. masaris* Duclos, 1835 as a **subjective junior synonym** of *O. miniacea* (Röding, 1798).

O. azemula Duclos, 1840 (Hist. Nat., Pl. 14, Figs. 1, 2; description in Illustr. Conch., p. 17, a text referring to Pl. 15, Figs. 1, 2, 10, 11 and also to Pl. 14, Fig. 7, a figure bearing the caption *O. erythrostoma*). The type lot is a heterogeneous. 3 of the syntypes (see PL. 2, FIG. 7) are *O. ponderosa* Duclos, 1840, 2 are *O. miniacea* (Röding, 1798) (see PL. 2, FIG. 1) and one is *O. miniacea tremulina* Lamarck, 1811 (see PL. 3, FIG. 1). The taxon *O. azemula* Duclos was a mixture of *O. ponderosa* Duclos, 1840 and *O. miniacea* (Röding, 1798) for DAUTZENBERG (1927) and B. & B. (1967), was *O. miniacea* (Röding, 1798) for B. & B. (1967) and W. & A. (1967); a colour form of *O. miniacea* (Röding, 1798) for P. & S. (1986).

O. sylvia Duclos, 1845. There is no type material available for this taxon, considered as a form of *O. miniacea* (Röding, 1798) by B. & B. (1960, 1967), Z. & P. (1969), W. & A. (1967) and P. & S. (1986). This cannot be a colour form, because the author described it as occurring in various colourations (all white, all black, etc.). Duclos' good colour plates and his description (aperture "*de couleur aurore ou souci*") indicate that *O. sylvia* Duclos, 1845 should be considered as a **subjective junior synonym** of *O. miniacea* (Röding, 1798).

O. magnifica Ducros de St.Germain, 1857. The holotype (see PL. 2, FIG. 4) leaves no doubt that this is a **subjective junior synonym** of *O. miniacea* (Röding, 1798), as for B. & B. (1960), Z. & P. (1969), W. & A. (1967) and P. & S. (1986).

O. porphyritica Marrat, 1870 (authorship is correct, since the previous *porphyritica* of Martini is in a rejected work) was *O. miniacea* var. *johnsoni* Higgins, 1919 for B. & B. (1960) and *O. miniacea* (Röding, 1798) for Z. & P. (1969), W. & A. (1967) and P. & S. (1986). Marrat's description ("Quam *O. tremulinae* magis acuminatâ, variè picta; aperturâ intus aurantiâ") and his figures leave no doubt that this is a **subjective junior synonym** of *O. miniacea* (Röding, 1798).

O. lamberti Jousseaume, 1884. Examination of the holotype (PL. 2, FIG. 3, from New

Caledonia) leaves no doubt that this is a **subjective junior synonym** of *O. miniacea*. This was a valid species for W. & A. (1967), a subspecies of *O. miniacea* for P. & S. (1986).

O. sericea var. ***miniacea*** Johnson, 1910. The description "aperture a bright red" in JOHNSON (1910: 51) leaves no doubt that *O. sericea* ; Johnson (not Röding, 1798) var. *miniacea* Johnson, 1910 is the same as *O. miniacea* (Röding, 1798).

O. sericea var. ***marrati*** Johnson, 1910. JOHNSON (1910: 51 and 1915: 97) states that this name applies to "the dark brown red-mouthed form as figured by Marrat (*Thesaurus Conch.* pl. 7, f. 109)", which clearly depicts a very dark *O. miniacea* (Röding, 1798). One can thus consider *O. sericea* ; Johnson (not Röding, 1798) var. *marrati* Johnson, 1910 as a **colour form** of *O. miniacea* (Röding, 1798), as for B. & B. (1960, 1967), Z. & P. (1969), W. & A. (1967) and P. & S. (1986). This is entirely confirmed by examination of the tree syntypes at ANSP.

O. sericea var. ***johnsoni*** Higgins, 1919. The original description states this is the shell represented by Marrat in Pl. 7, Fig. 110 of the *Thesaurus*. This shell (with the caption *O. porphyritica*, see here above) is a somewhat dark specimen of *O. miniacea* (Röding, 1798), of which *Oliva sericea* ; Higgins (not Röding, 1798) var. *johnsoni* Higgins, 1919 is a **subjective junior synonym**. This is in agreement with B. & B. (1960), Z. & P. (1969), W. & A. (1967). It is a colour form for P. & S. (1986).

O. erythrostoma var. ***efasciata*** Dautzenberg, 1927. This name was given by DAUTZENBERG (1927: 39) to "the part of *O. azemula* Duclos, 1840 (*q.v.*) which is not *O. ponderosa* Duclos, 1840". It was a synonym of *O. miniacea* (Röding, 1798) for B. & B. (1960), a form of the same for B. & B. (1967), Z. & P. (1969), W. & A. (1967) and a subspecies for P. & S. (1986). No type specimen was designated, and no specimen with such label could be found in the Dautzenberg collection (now at IRSNB). Study of the collection leaves no doubt on the author's concept of *O. erythrostoma* and it follows that the variety *efasciata* Dautzenberg, 1927 is a **colour form** of *O. miniacea* (Röding, 1798).

O. erythrostoma var. ***saturata*** Dautzenberg, 1927. No type specimen was designated, but examination of Dautzenberg's specimens (now at IRSNB) leaves no doubt (see PL. 2, FIG. 5) that this is a **colour form** of *O. miniacea* (Röding, 1798), as for B. & B. (1960, 1967), Z. & P. (1969), W. & A. (1967) and P. & S. (1986).

O. berti Terzer, 1986. This taxon (Paratype 1 is figured PL. 2, FIG. 2) is based upon very small (about 30 mm) specimens of *O. miniacea* (Röding, 1798) from Kwajalein, Marshall Islands. In this locality, the size reached by "adult" (thick lipped) specimens is extremely variable. We have examined a large, homogeneous syntopic series including specimens up to 87.67 mm and were unable to find any reliable discriminant character. *Oliva berti* Terzer, 1986, the remarkable dwarf variant occurring in Micronesia, is a **local form** of *O. miniacea* (Röding, 1798). The author (*personal communication*) now agrees with this disposition.

The following names have been mistakenly considered as synonyms or constitute errors in identification:

O. sericea (Röding, 1798) (*q.v.*). This **valid species** (*q.v.*) was a form of *O. miniacea* (Röding, 1798) for JOHNSON (1910).

O. tremulina Lamarck, 1811 (*q.v.*). This was a form of *O. miniacea* (Röding, 1798) for JOHNSON (1910). We now treat it as a **subspecies** (see below). It is most probably the same as "*tremulina* Duclos, 1835" cited by B. & B. (1960) and W. & A. (1967) as a synonym of *O. miniacea* (Röding, 1798). DUCLOS, who was familiar with Lamarck's specimens (see GREIFENEDER, DUCHAMPS & TURSCH, 1995), after stating "*ore pallido*" in his Latin diagnosis of *O. tremulina* Lamarck, 1811, describes it as having a very variable aperture colouration: "*J'ai des individus qui l'ont blanche; d'autres l'ont chamois, mauve, violette, bleue; enfin une dernière qui l'a d'une teinte qui peut rivaliser la plus belle feuille de rose*" (DUCLOS 1840: 17),. This is probably the cause of the confusion. The problem is unimportant: as expected, there is a intergradation zone between the two subspecies, where individuals of intermediate hues do occur.

O. titea Duclos, 1845 (DUCLOS in Chenu, p.20, Pl. 36, Figs. 3, 4) is a small (15 mm), white American fossil (possibly an *Olivella* ?) from the Walnut Hills, near Vicksburgh. It is indeterminate for W. & A. (1967). Why P. & S. (1986: 95) consider this minute American fossil as being the white colour form of *O. miniacea* (Röding, 1798) is not clear to us.

O. sericea var. ***zeilanica*** Johnson, 1910 was *O. miniacea* (Röding, 1798) for B. & B. (1960), W. & A. (1967) and P. & S. (1986). The spire in the adult shell is said by JOHNSON (1910: 51)

to be "covered with a callus". The author also states that "it merges into ... the var. *ornata* Marr." This indicates that the name *O. sericea* ; Johnson (not Röding, 1798), 1910 var. *zeilanica* ; Johnson (not Lamarck, 1811), 1910 is a **subjective junior synonym** of *O. irisans* Lamarck, 1811. (for this name, see GREIFENEDER, DUCHAMPS & TURSCH, 1995).

DIAGNOSIS.

In addition to the numerical discriminants reported in Table 1, the following features are useful for recognising *O. miniacea*:

Shell up to about 90 mm. Aperture orange to orange beige (+++). Lower part of columella often diffused with same colour as the aperture (++), not characteristic. In old specimens posterior parietal callus variable, but most often at level with the filament channel of previous whorl.

Spire. Profile of spire whorls: variable, mostly straight, not convex (++).

Body whorl. Subchannel markings: oblique linear or chevron markings, very variable in number (6 to 23), colour and shape. Background colour very variable: cream, beige to apricot. Shoulder zone: thin band with reduced pattern. Body whorl pattern: very variable. In many populations the grey brown vertical pattern elements are often foreshadowed by adjacent, parallel orange forerunners. Occasional specimens partly or completely overlaid with dark brown, black or orange.

Suprafasciolar band: upper zone with pattern lacking or very reduced; lower zone with many different patterns, rarely coalescent (see PL. 5, FIGS. 17-20). Width of fasciolar band very narrow (mean: 6.0% of lip length) (+++).

DISTRIBUTION.

Very large distribution in the Western Pacific. East to Samoa, North to Okinawa and Marshall Is., West to Indonesia and Gulf of Thailand, South to Queensland.

Oliva miniacea flammeacolor
Petuch & Sargent, 1986.

Oliva (*Miniaceoliva*) *tremulina flammeacolor* Petuch & Sargent, 1986: 100, Pl. 15, Figs. 5-7.

TYPE MATERIAL.

Holotype in USNM, n° 841458 (figured PL. 2, FIG. 6). Paratype n° C153546 at AMS.

DIAGNOSIS.

In addition to the numerical discriminants reported in Table 1, the following features are useful for recognising *O. miniacea flammeacolor*:

Shell up to about 90 mm, often light for its size. Aperture greyish-beige inside. Margin of lip apricot to dull orange(+++). Lower part of columella apricot to dull orange (+++), often with smoky grey at upper margin of fasciole (++). In old specimens, posterior parietal callus mostly below channel of previous whorl.

Spire. Profile of spire whorls: variable, mostly concave, not convex (++). Strokes on spire whorls generally darker than in *O. miniacea tremulina* (++).

Body whorl. Subchannel markings: 10 to 18 very variable markings, often with complex structure. Background colour: pale to vivid apricot (+++). Shoulder zone: thin band with reduced pattern. Body whorl pattern: less variable and darker than in *O. miniacea tremulina* (++). Very occasional specimens partly overlaid with black or dark brown.

Suprafasciolar band: upper zone with pattern lacking or very reduced; lower zone with "tiger pattern" of repeating very dark strokes, stronger than in *O. miniacea tremulina* (++) (see PL. 5, FIGS. 15,16). Fasciolar band very narrow (mean: 6.2% of lip length) (+++).

DISTRIBUTION.

South India, Sri Lanka, Maldives.

Oliva miniacea tremulina
Lamarck, 1811.

Oliva tremulina Lamarck, 1811: 310, sp. n° 5.

Oliva olympiadina Duclos, 1835: Pl. 12, Figs. 10-12.
Oliva azemula Duclos, 1840: Pl. 14, Figs. 1, 2. (*pars*).
Oliva nobilis Reeve, 1850: Pl. 2, Fig. 3.
Oliva concinna Marrat, 1870: 12, Pl. 7, Fig. 101, sp. 60 (*pars*).
Oliva tenebrosa Marrat, 1870: 13, Fig. 177, sp. n° 58*.
Oliva fumosa Marrat, 1871: 13, Fig. 119, sp. n° 58.

TYPE MATERIAL.

Oliva olympiadina Duclos, 1835: two figured syntypes at MNHN.
Oliva azemula Duclos, 1840: six syntypes at MNHN.
Oliva nobilis Reeve, 1850: type n° 1892.9.24.18 at BM(NH).
Oliva concinna Marrat, 1870: one (n° 101) of two figured syntypes, at MCM.

Oliva tenebrosa Marrat, 1870: holotype at MCM.
Oliva fumosa Marrat, 1871: holotype at MCM.

SYNONYMY.

For the validity of the name *O. tremulina* Lamarck, 1811, see GREIFENEDER, DUCHAMPS & TURSCH (1995). As discussed under *O. miniacea s.s.* (*q.v.*), "*O. tremulina* Duclos 1835", cited by B. & B. (1960) and W. & A. (1967) as a synonym of *O. miniacea* (Röding, 1798), is most probably the same.

The following names are synonyms:

O. olympiadina Duclos, 1835. This was a colour form of *O. pica* Lamarck, 1811 (which is a nomen dubium, see GREIFENEDER, DUCHAMPS & TURSCH, 1995) for P. & S. (1986), and *O. tremulina* Lamarck, 1811 (or a form of this) for B. & B. (1960), Z. & P. (1969) and W. & A. (1967). The latter considered "*O. olympiadina* Duclos, 1844" as being *O. fulgurator* (Röding, 1798), a very distinct Western Atlantic species. The two figured syntypes of *O. olympiadina* Duclos, 1835 (H: 69.0, D: 29.3 mm and H: 74.0, D: 33.8 mm, figured PL. 3, FIGS. 6, 7) are undoubtedly different colour forms of *O. miniacea tremulina* Lamarck, 1811, of which *O. olympiadina* Duclos, 1835 is a **subjective junior synonym**.

O. azemula Duclos, 1840 (*pars*). One of the six syntypes at MNHN (H: 60.0, D: 27.2 mm, figured PL. 3, FIG. 1) is undoubtedly *O. miniacea tremulina* Lamarck, 1811.

O. nobilis Reeve, 1850. This was *O. tremulina* Lamarck, 1811 for B. & B. (1960, 1967), Z. & P. (1969), W. & A. (1967) and P. & S. (1986). The type, at BM(NH) (H 63.2, D 27.6 mm, figured PL. 3, FIG. 2) is undoubtedly a colour form of *O. miniacea tremulina* Lamarck, 1811, of which *O. nobilis* Reeve, 1850 is a **subjective junior synonym**. Two other syntypes figured by Reeve (Figs. 4b, 4c, from the Steere and Cole collections) were not located.

O. concinna Marrat, 1870. This **valid species** was a form of *O. tremulina* Lamarck, 1811 for TOMLIN (in FORD, 1953), B. & B. (1967), Z. & P. (1969), W. & A. (1967). This is true for one of the figured specimens, n° 101 (H: 44.2, D: 17.8 mm, illustrated PL. 3, FIG. 4) of the heterogeneous type lot (see discussion under *O. concinna* Marrat, 1870).

O. tenebrosa Marrat, 1870 (Thesaurus, p. 13, Fig. 177, sp. n° 58, locality "Borneo" very doubtful) was a synonym of *O. concinna* Marrat for W. & A. (1967). The holotype (H: 66.5, D: 27.0 mm, figured PL. 3, FIG. 5) is just a dark specimen of *O. miniacea tremulina* Lamarck, 1811, of which *O. tenebrosa* Marrat, 1870 is a **subjective junior synonym**, as correctly stated by B. & B. (1960) and Z. & P. (1969). In any case, *O. tenebrosa* Marrat, 1870 is a junior homonym of *O. tenebrosa* Wood, 1828, itself a junior synonym of *O. undatella* Lamarck, 1811, as for B. & B. (1960), Z. & P. (1969), KEEN (1971), W. & A. (1967) and P. & S. (1986). *O. tenebrosa* ; Petuch & Sargent (not Marrat, 1870), 1986 is a colour form of *O. elegans* Lamarck, 1811.

O. fumosa Marrat, 1871. The holotype (H: 73.0, D: 31.3 mm, figured PL. 3, FIG. 3), probably from the S.W. Indian Ocean, is undoubtedly *O. tremulina* Lamarck, 1811, of which *O. fumosa* Marrat, 1871 is a **subjective junior synonym**, as correctly stated by TOMLIN (in FORD, 1953), B. & B. (1960), Z. & P. (1969) and W. & A. (1967).

The following names have been mistakenly considered as synonyms or constitute errors in identification:

O. hepatica Lamarck, 1811 (Ann. Mus.: 320, sp. n° 35) was a synonym of *O. tremulina* Lamarck, 1811 for B. & B. (1960), Z. & P. (1969), W. & A. (1967) and P. & S. (1986). This was already the interpretation of DUCLOS (1840: 17). *O. hepatica* Lamarck, 1811 is a **nomen dubium** (see GREIFENEDER, DUCHAMPS & TURSCH, 1995).

Oliva pica Lamarck, 1811 was a synonym of *O. tremulina* Lamarck, 1811 for B. & B. (1960), a probable form of the same for Z. & P. (1969) and a valid species for P. & S. (1986). This is also a **nomen dubium** (see GREIFENEDER, DUCHAMPS & TURSCH, 1995).

O. zeilanica Lamarck, 1811 was *O. tremulina* Lamarck, 1811 for B. & B. (1960), Z. & P. (1969) and W. & A. (1967). It has been shown to be a **nomen dubium** (see GREIFENEDER, DUCHAMPS & TURSCH, 1995).

O. sericea var. ***zeilanica*** Johnson, 1910. The description refers to a "smaller race quite readily separated in the adult but completely connected with *tremulina* in younger specimens." See *zeilanica* under *O. miniacea*.

O. obtusaria Lamarck, 1822 was a synonym of *O. tremulina* Lamarck, 1811 for B. & B. (1960), W. & A. (1967) and P. & S. (1986) and was impossible to identify for B. & B. (1967). This is again a **nomen dubium** (see GREIFENEDER, DUCHAMPS & TURSCH, 1995).

O. masaris Duclos, 1835 (*pars*) was *O. tremulina* Lamarck, 1811 for B. & B. (1967). This, together with the misspelling "*O.*

messaris" has been discussed under *O. miniacea s.s* (*q.v.*).

"***O. irisans* Duclos, 1835**" was possibly (*in pars*) *O. tremulina* ; Zeigler & Porreca (non Lamarck, 1811), 1969 forma *chrysoides* Dautzenberg, 1927 for Z. & P. (1969), and *O. cryptospira* Ford, 1891 for B. & B. (1960). "*O. irisans* Duclos, 1835" is the same as *O. irisans* Lamarck, 1811, a valid species (see GREIFENEDER, DUCHAMPS & TURSCH, 1995). From the original illustrations of FORD (1891: p. 136, Figs. 3, 4) it is clear that *O. cryptospira* Ford, 1891 is *O. irisans* Lamarck, 1811.

O. hirasei Kira, 1959 was listed as a possible synonym of *O. tremulina* Lamarck, 1811 by B. & B. (1960). That it constitutes a separate, **valid species** is clear from the evidence presented in section 4.2.

O. tremulina forma ***oldi*** Zeigler, 1969 was a form of *O. tremulina* Lamarck, 1811 for Z. & P. (1969) and W. & A. (1967). *O. tremulina* ; Zeigler (not Lamarck, 1811), 1969 forma *oldi* Zeigler, 1969 has been discussed under *O. concinna* Marrat, 1870 (*q.v.*), where it belongs.

O. tremulina var. ***chrysoides*** Dautzenberg, 1927. The case of *O. tremulina* ; Dautzenberg (not Lamarck, 1811), 1927 var. *chrysoides* Dautzenberg, 1927 has also been discussed under *O. concinna* Marrat (*q.v.*), 1870, where it belongs.

DIAGNOSIS.

In addition to the numerical discriminants reported in Table 1, the following features are useful for recognising *O. miniacea tremulina*:

Shell up to about 90 mm. Aperture white to bluish and cream (+++). Lower part of columella cream, to faint smoky (++). In old specimens , posterior parietal callus mostly below filament channel of previous whorl.

Spire. Profile of spire whorls: variable, mostly concave, not convex (++).

Body whorl. Subchannel markings: 10 to 18 very variable markings, often with complex structure. Background colour: generally cream to beige (+++). Shoulder zone: thin band with reduced pattern. Body whorl pattern: very variable. Occasional specimens partly or completely overlaid with black or dark brown.

Suprafasciolar band: upper zone with pattern lacking or very reduced; lower zone with "tiger pattern" of repeating dark strokes (++) (see PL. 5, FIGS. 13, 14). Fasciolar band very narrow (mean: 5.6% of lip length).

Note: As it could be expected, intergrades between the subspecies *O. miniacea tremulina* and the typical *O. miniacea* are found at the common border of their distribution zones, along the Indonesian arc.

DISTRIBUTION:

Madagascar, Mauritius, Mozambique, Reunion, Seychelles, Tanzania.

Oliva ponderosa Duclos, 1840

Oliva ponderosa Duclos, 1840: Pl. 13, Figs. 8, 9.

Oliva azemula Duclos, 1840: Pl. 14, Figs. 1, 2. (*pars*).

TYPE MATERIAL:

Oliva ponderosa Duclos, 1840: 9 syntypes at MNHN (Figured syntype, H: 57.3, D: 30.8 mm, illustrated PL. 2, FIG. 8).

Oliva azemula Duclos, 1840: 6 syntypes at MNHN.

SYNONYMY.

O. azemula Duclos, 1840 (*pars*). Three of the six syntypes (one of these, H: 59.9, D: 28.9 mm, is figured PL. 2, FIG. 7) are undoubtedly *O. ponderosa* Duclos. For the others, see *O. azemula* Duclos, 1840 under *O. miniacea* (Röding, 1798).

DIAGNOSIS.

In addition to the numerical discriminants reported in Table 1, the following features are useful for recognising *O. ponderosa*:

Shell up to about 70 mm. Large specimens very heavy. Aperture pale pink or pale orange (+++).

Spire. Profile of spire whorls: mostly straight (++). In old specimens, posterior parietal callus mostly below, not above channel of previous whorl.

Body whorl. Subchannel markings: 9 to 12 faint purplish, oblique linear or chevron markings. Background colour light cream. Shoulder zone: thin band with reduced pattern. Body whorl pattern: Light brown to greyish-purple markings arranged more or less vertically. Spiral darker bands mostly insignificant. Overlay with dark layers not observed.

Suprafasciolar band: upper zone with pattern lacking or very reduced; lower zone with repeating strokes "tiger pattern" of same colour as body whorl pattern, no very dark dots (see PL. 5, FIGS. 5, 6). Upper margin of white fasciole (just below posterior fasciolar groove) often tinged violet (++).

DISTRIBUTION.

Thought to be restricted to the Maldives region. Specimens very similar to *O. ponderosa* Duclos, 1840 (and possibly this species) have been reported from Pulau Mendjangan, Bali, Indonesia by WITTIG-SKINNER (1981).

Oliva sericea (Röding, 1798).

Porphyria sericea Röding, 1798: 33, sp. n° 390.

O. granitella Lamarck, 1811: 314, sp. n° 18.
Oliva textilina Lamarck, 1811: 309, sp. n° 2.
Oliva galeola Duclos, 1840: 30, Pl. 28, Figs. 4-6.
Oliva sabulosa Marrat, 1868 (2): 213.
O. textilina var. *albina* Melvill & Standen, 1897: 304.

TYPE MATERIAL.

Oliva galeola Duclos, 1840: three syntypes at MNHN.
Oliva sabulosa Marrat, 1868: two syntypes at MCM.

SYNONYMY.

For the validity of the name *O. sericea* (Röding, 1798), see TURSCH, DUCHAMPS & GREIFENEDER (1994). For the historical confusion around this name, see Introduction.

The following names are synonyms:

O. textilina Lamarck, 1811, a name still considered valid by Z. & P. (1969), is an **objective junior synonym** of *O. sericea* (Röding, 1798), both species being based upon the same figure of Martini (see GREIFENEDER, DUCHAMPS & TURSCH, 1995). This is in agreement with W. & A. (1967) and P. & S. (1986).

O. galeola Duclos, 1840. This was *O. funebralis* Lamarck, 1811 (a nomen dubium, see GREIFENEDER, DUCHAMPS & TURSCH, 1995) for B. & B. (1960), Z. & P. (1969) and W. & A. (1967). Of the three syntypes of *O. galeola* Duclos, 1840 at MNHN, two are juvenile *O. sericea* (Röding, 1798) (one of these, H: 28.8, D: 13.8 mm, is figured in PL. 3, FIG. 8). The third specimen (possibly adventitious, as DUCLOS, 1840: 30 describes his species as "*l'ouverture est blanche*") is *O. reticulata* (Röding, 1798). *O. galeola* Duclos, 1840 is thus a **subjective junior synonym** of *O. sericea* (Röding, 1798). *O. galeola ;* Petuch & Sargent (not Duclos, 1840), 1986 is represented (Pl. 6, Figs. 16, 17) by an entirely different shell, possibly *O. dactyliola* Duclos, 1840. As for *O. galeola ;* Petuch & Sargent (not Duclos, 1840), 1986 color form *lutea ;* Petuch & Sargent (not Marrat, 1871), 1986 (Pl. 6, Figs. 21, 22), this is yet another, entirely different shell, possibly *O. elegans* Lamarck, 1811.

O. sabulosa Marrat, 1868. The type material (one of the two syntypes, H: 52.0, D: 22.0 mm is figured PL. 3, FIG. 9) shows that this is undoubtedly a **subjective junior synonym** of *O. sericea* (Röding, 1798), as for WILKINS (in FORD, 1953), B. & B. (1967), Z. & P. (1969), W. & A. (1967) and P. & S. (1986). MARRAT himself was probably aware of this, as the name is not cited any more in the *Thesaurus*.

O. textilina var. ***albina*** Melvill & Standen, 1897. The very short description clearly indicates that this is a **subjective junior synonym** of *O. sericea* (Röding, 1798). This was *O. textilina* for B. & B. (1960), a variety of *O. textilina* for Z. & P. (1969), a form of *O. sericea* for B. & B. (1967) and W. & A. (1967).

O. granitella Lamarck, 1811. This is a **subjective junior synonym** of *O. sericea* (Röding, 1798) (see GREIFENEDER, DUCHAMPS & TURSCH, 1995), as for B. & B. (1967), W. & A. (1967) and P. & S. (1986). It was *O. textilina* Lamarck, 1811 for B. & B. (1960) and Z. & P. (1969).

The following names have been mistakenly considered as synonyms or constitute errors in identification:

O. sericea var. ***miniacea*** Johnson, 1910. The case of *O. sericea* ; Johnson (not Röding, 1798), 1910 var. *miniacea* Johnson, 1910 has been discussed under *O. miniacea* (Röding, 1798) (*q.v.*), where it belongs.

O. sericea var. ***fordi*** Johnson, 1910: 51. Under his variety *zeilanica* Lamarck, 1822 (a nomen dubium, see GREIFENEDER, DUCHAMPS & TURSCH, 1995), JOHNSON created a new variety *fordi* (a variety of a variety!). It was defined as the dark brown form of *O. cryptospira* Ford, 1891, resembling *O. tenebrosa* ; Johnson (not Marrat, 1870), 1910, This is the shell figured by MARRAT on Pl. 9, Fig. 126 in the *Thesaurus* with the correct caption *O. irisans* Lamarck, 1811. Therefore *O. sericea* ; Johnson (not Röding, 1798), 1910 var. *fordi* Johnson, 1910 is expected to be a **colour form** of *O. irisans* Lamarck, 1811. This was also the conclusion of P. & S. (1986) and it is entirely confirmed by examination of the type specimen of *O. sericea* var. *fordi* Johnson, 1910. It was a form of *O. lignaria* Marrat, 1868 for B. & B. (1967), Z. & P. (1969) and W. & A. (1967). The "var. *fordii* Johnson" is a misspelling in JOHNSON (1915: 98).

O. sericea var. ***marrati*** Johnson, 1910. The case of *O. sericea* ; Johnson (not Röding, 1798), 1910 var. *marrati* Johnson, 1910 has been discussed under *O. miniacea* (Röding, 1798), where it belongs.

O. sericea var. ***johnsoni*** Higgins, 1919. The case of *O. sericea* ; Higgins (not Röding, 1798), 1919 var. *johnsoni* Higgins, 1919 has also been discussed under *O. miniacea* (Röding, 1798) (*q.v.*), where it belongs.

O. sericea var. ***albescens*** Johnson, 1915. This was described as a form of *Oliva sericea* (*sensu* Johnson, 1915) var. *cryptospira* Ford, 1891. *Oliva sericea* (*sensu* Johnson, 1915) is a mixture of many taxa, but the one line description: "There is also a pure white, callous-spired form (*albescens*)" fortunately leaves no doubt that *O. sericea* ; Johnson (not Röding, 1798), 1915 var. *cryptospira* Ford, 1891 forma *albescens* Johnson, 1915 is a **colour form** of *O. irisans* Lamarck, 1811, as correctly deduced by P. & S. (1986) and confirmed by examination of the type specimens of *O. cryptospira* Ford, 1891 and *O. sericea albescens* Johnson, 1915, both at ANSP. This was *O. textilina* Lamarck, 1811 for B. & B. (1960), and a form of *O. lignaria* Marrat, 1868 for B. & B. (1967) and W. & A. (1967).

DIAGNOSIS.

In addition to the numerical discriminants reported in Table 1, the following features are useful for recognising *O. sericea*:

Shell up to 90 mm, quite thick and heavy (++). Aperture creamy-beige (+++). Faint smoky diffusion on fasciole. In old specimens, callus at upper end of pillar above channel of previous whorl (+++).

Spire. Profile of spire whorls: convex (+++). First postnuclear whorls fused (filament channel filled with glassy material) (++).

Body whorl. Subchannel markings: numerous fine, short oblique linear or chevrons markings. Background colour: cream. Shoulder zone: upper band of body whorl pattern reaching or nearly reaching subchannel pattern (+++). Body whorl pattern: very fine network of grey-brown lines, often finely puncticulate. Overlay with dark layers not observed.

Suprafasciolar band: upper zone with irregular mottlings (++); lower zone with irregular "tiger pattern" (++) (see PL. 5, FIGS. 7, 8).

DISTRIBUTION.

Sri Lanka, Fiji, Samoa, Solomons, Papua New Guinea, Maldives, Philippines, Indonesia, Taiwan, Okinawa, Vietnam, Queensland.

Index to names. (valid taxa in bold).

albescens Johnson, 1915: colour form of *O. irisans* Lamarck, 1811.
albina Melvill & Standen, 1897: subjective junior synonym of *O. sericea* (Röding, 1798).
atalina Duclos, 1835: valid species.
aurantiaca Schumacher, 1817: objective junior synonym of *O. miniacea* (Röding, 1798).
azemula Duclos, 1840 (*pars*): subjective junior synonym of *O. miniacea* (Röding, 1798).
azemula Duclos, 1840 (*pars*): subjective junior synonym of *O. miniacea tremulina* Lamarck, 1811.
azemula Duclos, 1840 (*pars*): subjective junior synonym of *O. ponderosa* Duclos, 1840.
berti Terzer, 1986: local form of *O. miniacea* (Röding, 1798).
caerulea (Röding, 1798): valid species.
chrysoides Dautzenberg, 1927: colour form of *O. concinna* Marrat, 1870.
concinna Marrat, 1870: valid species.
concinna Marrat, 1870 (pars): subjective junior synonym of *O. miniacea tremulina* Lamarck, 1811.
cryptospira Ford, 1891: subjective junior synonym of *O. irisans* Lamarck, 1811.
efasciata Dautzenberg, 1927: colour form of *O. miniacea* (Röding, 1798).
episcopalis Lamarck, 1811: subjective junior synonym of *O. caerulea* (Röding, 1798).
erythrostoma Lamarck, 1811: objective junior synonym of *O. miniacea* (Röding, 1798).
flammeacolor Petuch & Sargent, 1986: subspecies of *O. miniacea* (Röding, 1798).
fordi Johnson, 1910: colour form of *O. irisans* Lamarck.
fordii Johnson, 1910: misspelling for *fordi* Johnson, 1910.
fulva Marrat, 1871: subjective junior synonym of *O. atalina* Duclos, 1835.
fumosa Marrat, 1871: subjective junior synonym of *O. miniacea tremulina* Lamarck, 1811.
fumosa ; Zeigler & Porreca (not Marrat, 1871), 1969: subjective junior synonym of *O. hirasei* Kira.
fumosa ; Petuch & Sargent (not Marrat, 1871), 1986: subjective junior synonym of *O. concinna* Marrat, 1870.
galeola Duclos, 1840: subjective junior synonym of *O. sericea* (Röding, 1798).
granitella Lamarck, 1811: subjective junior synonym of *O. sericea* (Röding, 1798).
hepatica Lamarck, 1811: nomen dubium.
hirasei Kira, 1959: valid species.
johnsoni Higgins, 1919: subjective junior synonym of *O. miniacea* (Röding, 1798).

kremerorum Petuch & Sargent, 1986: form of *O. concinna* Marrat, 1870.
lamberti Jousseaume, 1884: subjective junior synonym of *O. miniacea* (Röding, 1798).
magnifica Ducros de St.Germain, 1857: subjective junior synonym of *O. miniacea* (Röding, 1798).
marrati Johnson, 1910: colour form of *O. miniacea* (Röding, 1798).
masaris Duclos, 1835: subjective junior synonym of *O. miniacea* (Röding, 1798).
mascarena n. sp. valid species.
mazaris, Duclos 1835: misspelling for *masaris*, Duclos, 1835.
messaris Marrat, 1871: misspelling and misquotation for *masaris*, Duclos, 1835.
miniacea (Röding, 1798): valid species.
miniata (Link, 1807): objective junior synonym of *O. miniacea* (Röding, 1798).
nobilis Reeve, 1850: subjective junior synonym of *O. miniacea tremulina* Lamarck, 1811.
O. obtusaria Lamarck, 1822: nomen dubium.
oldi Zeigler, 1969: colour form of *O. concinna* Marrat, 1870.
olympiadina Duclos, 1835: subjective junior synonym of *O. miniacea tremulina* Lamarck, 1811.
pica Lamarck, 1811: nomen dubium.
ponderosa Duclos, 1840: valid species.
porphyracea Perry, 1811: subjective junior synonym of *O. miniacea* (Röding, 1798).
porphyritica Marrat, 1870: subjective junior synonym of *O. miniacea* (Röding, 1798).
quersolina Duclos, 1835: subjective synonym of *O. atalina* Duclos, 1835.
sabulosa Marrat, 1868: subjective junior synonym of *O. sericea* (Röding, 1798).
saturata Dautzenberg, 1927: colour form of *O. miniacea* (Röding, 1798).
sericea (Röding, 1798): valid species.
soverbii Marrat, 1870: misspelling for *O. sowerbyi* Marrat, 1870.
sowerbyi Anton, 1839: small fossil from the Paris region, probably an *Ancilla*.
sowerbyi Ducros de Saint Germain, 1857 is an *Olivella*.
sowerbyi Marrat, 1870: subjective junior synonym of *O. atalina* Duclos, 1835.
stainforthi Reeve, 1850: subjective junior synonym of *O. atalina* Duclos, 1835.
stainforthii Reeve, 1850: misspelling for *O. stainforthi* Reeve, 1850.
sylvia Duclos, 1845: subjective junior synonym of *O. miniacea* (Röding, 1798).
tenebrosa Marrat, 1870: subjective junior synonym of *O. miniacea tremulina* Lamarck, 1811 and junior homonym of *O. tenebrosa* Wood, 1828.
tenebrosa Wood, 1828: subjective junior synonym of *O. undatella* Lamarck, 1811.
textilina Lamarck, 1811: objective junior synonym of *O. sericea* (Röding, 1798).
titea Duclos, 1845: small American fossil, possibly an *Olivella*.
tremulina Lamarck, 1811: subspecies of *O. miniacea* (Röding, 1798).
zeilanica Lamarck, 1811: nomen dubium.
zeilanica ; Johnson (not Lamarck, 1811), 1910: subjective junior synonym of *O. irisans* Lamarck, 1811.

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REFERENCES.

ANTON, H.E. 1839. *Verzeichniss der Conchylien welche sich in der Sammlung von Hermann Eduard Anton befinden*. Anton, Halle.

BURCH, J.Q. & R.L. BURCH 1960. *Catalog of recent and fossil Olives*. Issue 196. Minutes of the Conchological Club of Southern California.

BURCH, J.Q. & R.L. BURCH, 1967. The family Olividae. *Pac. Sci.* 21(4): 503-522.

DAUTZENBERG, P. 1927. Olividés de Nouvelle Calédonie et de ses dépendances. *J. Conchyl.* 71: 1-72, 103-147.

DUCLOS, P.L. 1835, 1840. *Histoire naturelle générale et particulière de tous les genres de coquilles univalves marines à l'état vivant et fossile*, publiée par monographies. Genre Olive. Paris.

DUCLOS, P.L. 1844-48. *Oliva* in J.C. CHENU, *Illustrations Conchyliologiques, ou description et figures de toutes les coquilles connues, vivantes et fossiles*. 4 vols. 85 livraisons, Paris.

DUCROS de SAINT GERMAIN, A.M.P. 1857. *Revue critique du Genre Oliva de Bruguière*. Fernand Thibaud. Clermont.

FORD, J. 1891. Description of new species of *Anctus* and *Oliva*. *The Nautilus* 4: 134-136.

FORD, W.K. 1953. Notes by J.R. le B. Tomlin, M.A. on the Marrat's species of *Oliva*. *North West. Natur.*: 24: 442-449.

FUTUYMA, D.J. 1986. *Evolutionary Biology*. 2nd edition. Sinance Associates, Sunderland, Mass.

GREIFENEDER, D., R. DUCHAMPS & B. TURSCH 1995. Studies on Olividae. XXIII. The Lamarckian names for *Oliva* species. *Apex* 10(2/3): 39-60.

HIGGINS, H.C. 1919. A new variety of *Oliva sericea miniacea*. *The Nautilus* 33: 58-59.

JOHNSON, C.W. 1910. Some notes on the Olividae. I. Oriental species. *The Nautilus* 24(5): 49-51.

JOHNSON, C.W. 1915. Further notes on the Olividae. I. Oriental species. *The Nautilus* 28(9): 97-104.

JOHNSON, C.W. 1928. A review of certain species of the Olividae. *The Nautilus* 42: 6-13.

JOUSSEAUME, F.P. 1884. Description de mollusques nouveaux. *Bull. Soc. Zool. France* 9: 180.

KAICHER, S. D. 1989. Card catalogue of world wide shells. Pack 54. Olividae part IV. St. Petersburg, Florida.

KEEN, M. 1971. *Seashells of tropical West America*. 2nd. ed. Stanford University Press.

KIRA, T. 1959. *Coloured illustrations of shells of Japan*. Hoikusha Publishing, Osaka.

LAMARCK, J.B.P.A. de M. de, 1810-11. Détermination des espèces de Mollusques testacés : continuation du genre Ovule, Tarrière, Ancillaire et Olive. *Ann. Mus. Hist. Nat.* 16 (for 1810): 300-328. Paris (Jan.-Mar. 1811).

LAMARCK, J.B.P.A. de M. de, 1822. *Histoire naturelle des animaux sans vertèbres*. 7: 416-440. Paris.

LINK, H.F. 1807. *Beschreibung der Naturalien-Sammlung der Universität zu Rostock*. Rostock.

MARRAT, F.P. 1868. On some new species of *Oliva*. *Ann. Mag. Nat. Hist.* 4(2): 212-214.

MARRAT, F.P. 1870-71. *Oliva* Bruguières. In G.B. SOWERBY, *Thesaurus Conchyliorum*.

MAYR, E. 1969. *Principles of systematic zoology*. McGraw Hill, New York.

MAYR, E. & P.D. ASHLOCK. 1991. *Principles of systematic zoology*. McGraw Hill, New York.

MELVILL, J.C. & R. STANDEN., 1897. Notes on a collection of shells from Lifu and Uvea, Loyalty Islands, formed by the Rev. James and Mrs. Hadfield, with a list of species. Part II. *J. Conch.* 7: 404.

PANCHEN, A.L. 1992. *Classification, evolution and the nature of biology*. Cambridge University Press.

PERRY, G. 1811. *Conchology, or the natural history of shells*. London.

PETUCH, E.J. & D.M. SARGENT 1986. *Atlas of the living olive shells of the world*. 253 pp., CERF editions, Charlottesville, VA.

REEVE, L. 1850. *Conchologia iconica or illustrations of the shells of molluscous animals*. Monograph of the genus *Oliva*, pls. 1-30, London.

SCHUMACHER, C.F. 1817. *Essai d'un nouveau système des habitations des vers testacés*. Schultz, Copenhagen.

SNEATH, P.H. & R.R. SOKAL 1973. *Numerical taxonomy*. W.H. Freeman and Co., San Francisco.

TERZER, G.L. 1986. A new species of *Oliva* from the Marshall Islands. *La Conchiglia* (210-211): 24-25.

TRYON, G.W. 1883. *Manual of Conchology*. Ser. 1, Vol. 5. Marginellidae, Olividae, Columbellidae. Philadelphia.

TURSCH, B. 1988. Studies on Olividae. VIII. Protoconch measurements as supraspecific characters in the family Olividae. *The Veliger* 31: 244-251.

TURSCH, B. 1994. Studies on Olividae XXI. The scale of sympatry in the genus *Oliva*. *Apex* 9(4): 131-142.

TURSCH, B. 1995. Micro-endemism, allotopy and taxonomy in the genus *Oliva*. *Abstr. 12th Intl. Malac. Congr.*, Vigo: 107-109.

TURSCH, B., R. DUCHAMPS & D. GREIFENEDER. 1994. Studies on Olividae. XX. The pre-Lamarckian names for *Oliva* species. *Apex* 9(2-3): 51-78.

TURSCH, B. & L. GERMAIN 1985. Studies on Olividae. I. A morphometric approach to the *Oliva* problem. *Indo-Malayan Zool.* 1: 331-352.

TURSCH, B. & L. GERMAIN 1986. Studies on Olividae. II. Further protoconch morphometrical data for *Oliva* taxonomy. *Apex* 1(2): 39-45.

TURSCH, B. & L. GERMAIN 1987. Studies on Olividae. V. Five additional protoconch characters for *Oliva* taxonomy. *Apex* 2(3/4): 59-68.

TURSCH, B., L. GERMAIN & D. GREIFENEDER 1986a. Studies on Olividae. III. Description of a novel subspecies: *Oliva bulowi phuketensis*. *Apex* 1(3): 71-87.

TURSCH, B., L. GERMAIN & D. GREIFENEDER 1986b. Studies on Olividae. IV. *Oliva annulata* Gmelin, 1791 (of authors): a confusion of species. *Indo-Malayan Zool.* 3: 189-216.

TURSCH, B. & D. GREIFENEDER 1989a. Studies on Olividae. X. The taxonomic status of *Oliva esiodina* Duclos, 1844, *O. duclosi* Reeve, 1850 and *O. lentiginosa* Reeve, 1850. Apex 4(4) : 57-68.

TURSCH, B. & D. GREIFENEDER 1989b. Studies on Olividae. XI. *Oliva chrysoplecta* sp. n., a familiar, undescribed Western Pacific species. *Apex* 4(4): 69-84.

TURSCH, B. & D. HUART 1988. Studies on Olividae. VII. Note on *Oliva dolicha* Locard, 1896, *O.flammulata* Lamarck, 1810 and *O.flammulata verdensis* Petuch & Sargent, 1986. *Apex* 3: 39-46.

TURSCH, B. & D. HUART 1990. Studies on Olividae. XII. The "*Oliva* problem" in America: a preliminary survey. *Apex* 5(3/4): 51-73.

TURSCH,B., O. MISSA & J. BOUILLON, 1992. Studies on Olividae XIV. The taxonomic structure of *Oliva oliva* (auct.). *Apex* 7(1): 3-22.

VAN OSSELAER, C. & B. TURSCH. 1994. Studies on Olividae. XIX. Where is the suture of *Oliva* shells? *Apex* 9(2/3): 47-50.

WAGNER, R.J.L. & R.T. ABBOTT 1967. *Standard Catalog of Shells*. 2nd. edition. American Malacologists Inc., Greenville, Delaware.

WEINKAUF, H.C. 1878. *Systematisches Conchylien Cabinet*. Bnd.V., Abtl.1. Die Gattung *Oliva*. Nurenberg.

WITTIG-SKINNER, R. 1981. Olividae of Indonesia. *Acta Conchyliorum* 1: 91-114.

WOOD, W. 1828. Supplement to the *Index Testaceologicus*; or a catalogue of shells, British and foreign. London.

ZEIGLER, R.F. & H.C. PORRECA 1969. *Olive shells of the world*. Rochester Polychrome Press, Rochester, N.Y.

ZEIGLER, R.F. 1969. Two infrasubspecific forms in *Oliva*. *The Nautilus* 83(1): 14-19.

Plate 1 (opposite page).

Figs. 1-5. ***Oliva atalina*** Duclos, 1835.

1. *O. quersolina* Duclos, 1835. Syntype, MNHN (H: 36.5 mm, D: 16.2 mm).
2. *O. atalina* Duclos, 1835. Syntype, MNHN (H: 54 mm, D: 24.7 mm).
3. *O. fulva* Marrat, 1871. Holotype, MCM (H: 32.3 mm, D: 15.0 mm).
4. *O. sowerbyi* Marrat, 1870. Syntype, MCM (H: 32.2 mm, D: 15.0 mm).
5. *O. stainforthi* Reeve, 1850. Syntype, BM(NH) (H: 34.2 mm, D: 17.0 mm).

Figs. 6-9. ***Oliva concinna*** Marrat, 1870.

6. *O. tremulina* var. *chrysoides* Dautzenberg, 1927. Specimen from Dautzenberg collection (IRSNB) (H: 46.3 mm, D: 19.1 mm). No locality.
7. *O. concinna* Marrat, 1870. Figured syntype, MCM (H: 44.2 mm, D: 17.8 mm). Selected as lectotype.
8. *O. (Miniaceoliva) fumosa kremerorum* Petuch & Sargent, 1986. Holotype, USNM n° 841460. (H: 52.9 mm, D: 21.4 mm). near Zamboanga, Philippines.
9. *O. tremulina* forma *oldi* Zeigler, 1969. Holotype, AMNH n° 147750 (H: 56.6 mm, D: 24.7 mm). Buin, Bougainville, Solomon Is..

Figs. 10-11. ***Oliva hirasei*** Kira, 1959.

10. *O. hirasei* Kira, 1959. BT-4154, (H: 43.7 mm, D: 20.4mm), Calapan, Philippines.
11. *O. hirasei* Kira, 1959. BT-4150, (H: 49.4 mm, D: 22.6 mm), dredged off Kaoshiung, Taiwan, 1962.

Scale bars: 10 mm.

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Plate 2 (opposite page).

Figs. 1-5. ***Oliva miniacea*** (Röding, 1798).

1. *O. azemula* Duclos, 1840. Syntype, MNHN (H: 65.8 mm, D: 31.7 mm).
2. *O. berti* Terzer, 1986. Paratype n° 1, Terzer collection (H: 29.8 mm, D: 12.4 mm). Kwajalein Atoll, Marshall Islands.
3. *O. lamberti* Jousseaume, 1884. Syntype, MNHN (H: 72.5 mm, D: 30.0 mm).
4. *O. magnifica* Ducros de St.Germain, 1857. Syntype, MNHN (H: 63.8 mm, D: 26.7 mm).
5. *O. miniacea* var. *saturata* Dautzenberg, 1927. Specimen from Dautzenberg collection (IRSNB) (H: 67.3 mm, D: 28.4 mm). New Caledonia.

Fig. 6. ***Oliva miniacea flammeacolor*** Petuch & Sargent, 1986.

6. *O.* (*Miniaceoliva*) *flammeacolor*, Petuch & Sargent, 1986. Holotype n° 841458, USNM (H: 67.1 mm, D: 29.1 mm).

Figs. 7-8. ***Oliva ponderosa*** Duclos, 1840.

7. *O. azemula* Duclos, 1840. Syntype, MNHN (H: 59.9 mm, D: 28.9 mm).
8. *O. ponderosa* Duclos, 1840. Figured syntype, MNHN (H: 57.3 mm, D: 30.8 mm).

Scale bars: 10 mm.

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Plate 3 (opposite page).

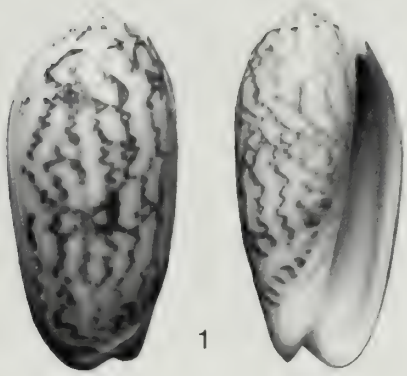
Figs. 1-7. ***Oliva miniacea tremulina*** Lamarck, 1811.

1. *O. azemula* Duclos, 1840. Syntype, MNHN (H: 60.0 mm, D: 27.2 mm).
2. *O. nobilis* Reeve, 1850. Syntype, BM(NH) n° 1892.9.24.18 (H: 63.2 mm, D: 27.6 mm).
3. *O. fumosa* Marrat, 1871. Holotype, MCM (H: 73.0 mm, D: 31.3 mm).
4. *O. concinna* Marrat, 1870. Figured syntype, MCM (H: 44.2 mm, D: 17.8 mm).
5. *O. tenebrosa* Marrat, 1870. Holotype, MCM (H: 66.5 mm, D: 27.0 mm).
6. *O. olympiadina* Duclos, 1835 . Figured syntype, MNHN (H: 74.0 mm, D: 33.8 mm).
7. *O. olympiadina* Duclos, 1835 . Figured syntype, MNHN (H: 69.0 mm, D: 29.3 mm).

Figs. 8-9. ***Oliva sericea*** (Röding, 1798).

8. *O. galeola* Duclos, 1840 . Syntype, MNHN (H: 28.8 mm, D: 13.8 mm).
9. *O. sabulosa* Marrat, 1868. Syntype, MCM (H: 52.0 mm, D: 22.0 mm).

Scale bars: 10 mm.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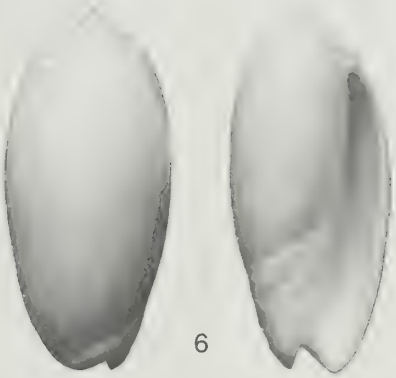
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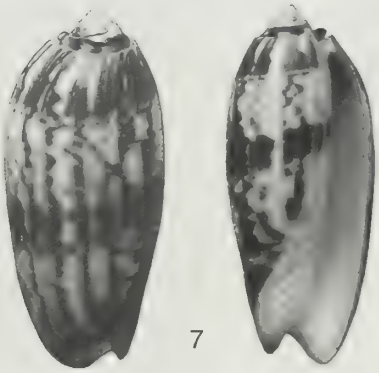
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Plate 4 (opposite page).

Figs. 1-6. ***Oliva mascarena*** n. sp.

1. *Oliva mascarena*, holotype, BM(NH) n° 1953.3.4.203 (H: 75.1mm; D: 35.1 mm), from Winckworth collection, with old label "*O. pica*". Collected at Aldabra, June 1938.
2. *Oliva mascarena* n. sp., paratype 1, BM(NH) n° 1953.3.4.204, (H: 68.5 mm; D: 31.0 mm), from Winckworth collection, with old label "*O. pica*". Collected at Aldabra, June 1938.
3. *Oliva mascarena* n. sp., paratype 2, IRSNB, (H: 71.5 mm; D: 32.0 mm), ex coll. Dautzenberg, (with old label "*O. pica,* probably from Mauritius").
4. *Oliva mascarena* n. sp., paratype 3, MNHN, (H: 67.8; D: 32.0 mm), ex coll. D. Greifeneder n° DG-3921a, Seychelles.
5. *Oliva mascarena* n. sp., paratype 4, D. Greifeneder coll., n° DG-3076, (H: 59.8 mm; D: 27.3 mm), Peros Banhos, Chagos.
6. *Oliva mascarena* n. sp., paratype 5, B. Tursch coll., n° BT-4370, (H: 65.6 mm; D: 29.4 mm), dredged 15 m, Beau Vallon, Seychelles, 1973.

Scale bars: 10 mm.

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Plate 5 (opposite page).

Figs. 1-20. **Patterns in the suprafasciolar zone**.

1. *O. atalina* Duclos, 1835, Mauritius.
2. *O. atalina* Duclos, 1835, Cargados.
3. *O. mascarena* n. sp., Seychelles.
4. *O. mascarena* n. sp., Mauritius.
5. *O. ponderosa* Duclos, 1840, Maldives.
6. *O. ponderosa* Duclos, 1840, Maldives.
7. *O. sericea* (Röding, 1798), Philippines.
8. *O. sericea* (Röding, 1798), Philippines.
9. *O. concinna* Marrat, 1870, New Caledonia.
10. *O. concinna* Marrat, 1870, New Britain.
11. *O. hirasei* Kira, 1959, Taiwan.
12. *O. hirasei* Kira, 1959, Philippines.
13. *O. miniacea tremulina* Lamarck, 1811.
14. *O. miniacea tremulina* Lamarck, 1811.
15. *O. miniacea flammeacolor* Petuch & Sargent, 1986, South India.
16. *O. miniacea flammeacolor* Petuch & Sargent, 1986, South India.
17. *O. miniacea* (Röding, 1798), Vietnam.
18. *O. miniacea* (Röding, 1798), Philippines.
19. *O. miniacea* (Röding, 1798), Philippines.
20. *O. miniacea* (Röding, 1798), Gilbert Is.

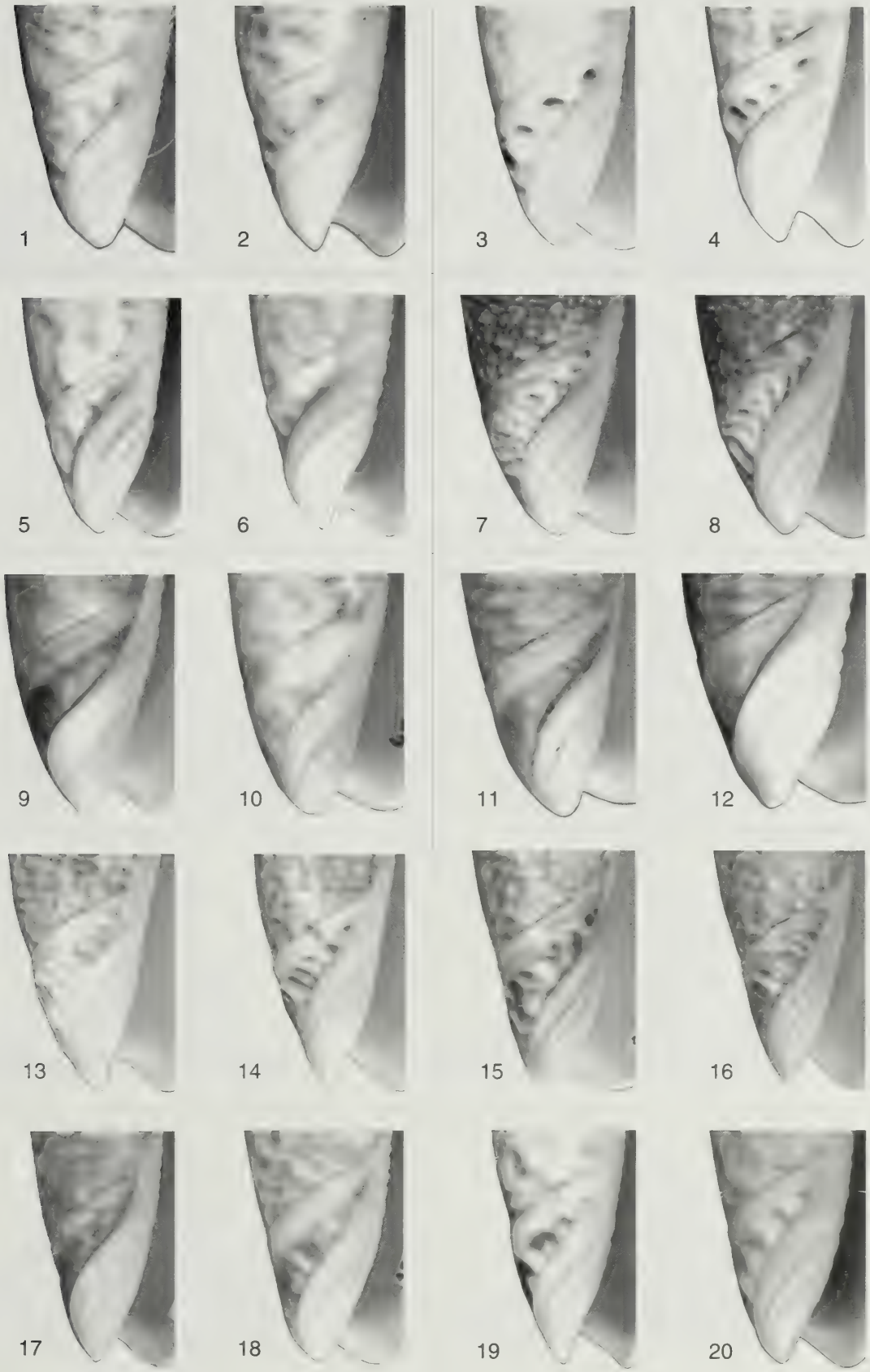
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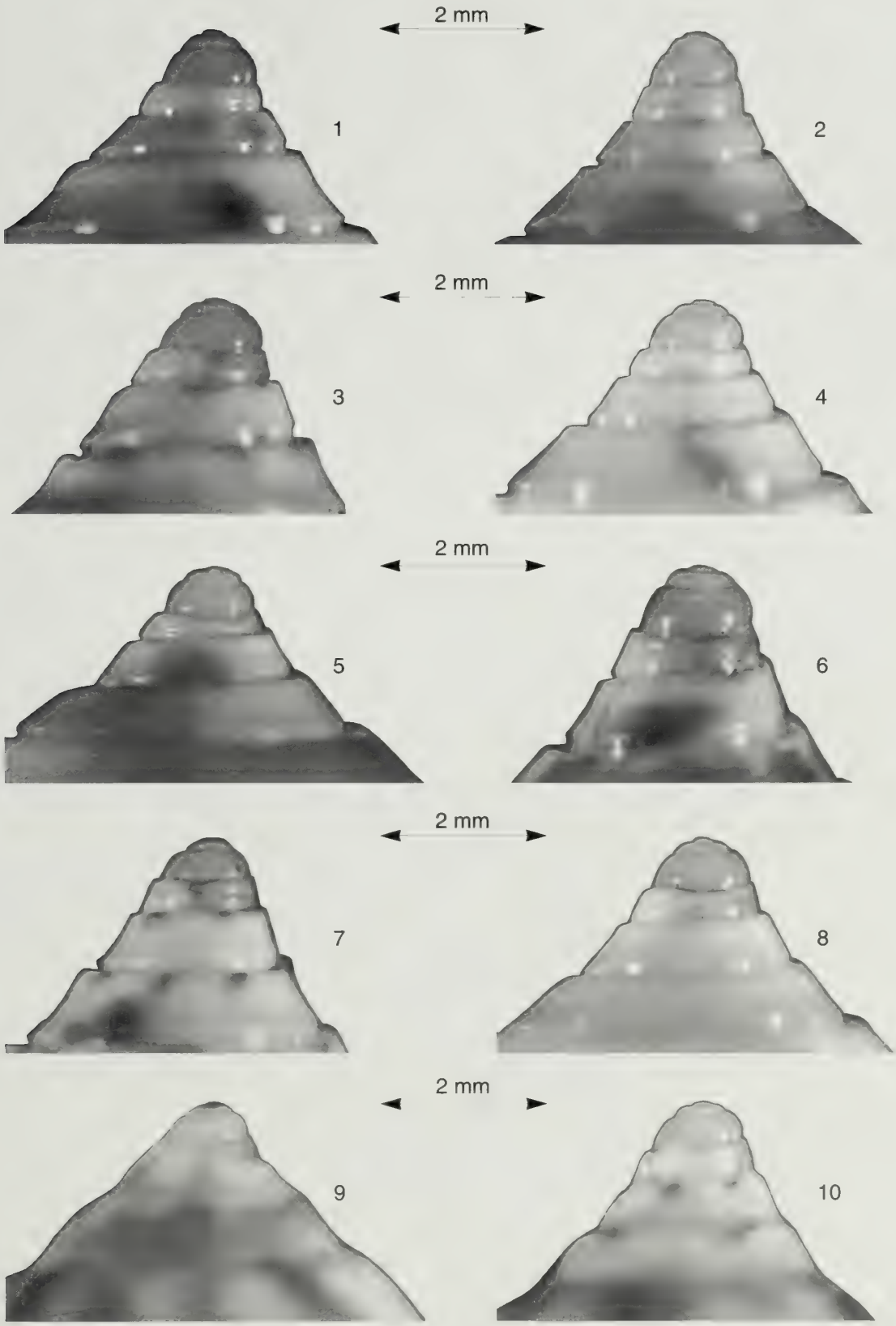
Plate 6 (opposite page).

Figs. 1-10. **Protoconchs**. (all figures at same scale).

1. *O. atalina* Duclos, 1835. Mauritius, DG-6180.
2. *O. concinna* Marrat, 1870. Philippines, BT-4342.
3. *O. hirasei* Kira, 1959. Philippines, BT-5025.
4. *O. mascarena* n. sp. Seychelles, BT-4368.
5. *O. miniacea* (Röding, 1798). Philippines, BT-5081.
6. *O. miniacea flammeacolor*, Petuch & Sargent, 1986. India, BT-0953.
7. *O. miniacea tremulina* Lamarck, 1811. Madagascar, BT-4710.
8. *O. ponderosa* Duclos, 1840. Maldives, BT-1953.
9. *O. sericea* (Röding, 1798). New Caledonia, BT-3341.
10. *O. sericea* (Röding, 1798). Bali, BT-0013.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APEX a paru pour la première fois en 1986, remplaçant notre revue *"INFORMATIONS de la Société Belge de Malacologie"*, qui en était à son treizième volume. Depuis dix ans, nous avons publié de nombreux articles dont vous trouverez un index en fin de ce numéro. A l'occasion du trentième anniversaire de notre société, nous aimerions remercier tous les scientifiques et autres personnes qui demeurent dans l'ombre au titre de "*referee*". Un "*referee*" est une personne à qui nous soumettons l'article original des auteurs, afin qu'elle le lise et nous donne son avis. Un "*referee*" doit rester anonyme (les auteurs ignorent qui a revu leur article, sauf demande exprèsse du "*referee*" lui-même). De ce fait, la plupart restent et resteront anonymes. Leur travail est fastidieux et considérable, la lecture et l'annotation d'un article pouvant prendre plusieurs heures, voire plusieurs jours. Nous tenons à leur exprimer notre gratitude: sans eux APEX n'aurait pas atteint sa présente renommée internationale.

ACKNOWLEDGEMENTS

APEX was published for the first time in 1986, to replace *"INFORMATIONS de la Société Belge de Malacologie"*, then at its 13th volume. Since ten years we have published numerous papers, which are indexed in the present issue. The 30th anniversary of our Society is a good opportunity to thank all the referees (scientists and others) who have accepted to review the many papers submitted to us. A referee has to stay anonymous and the author(s) may not know who has reviewed their paper (except at the request of the referee himself). The work of the referee is tedious and considerable: reviewing one paper might take several hours or even several days. We would like to express our gratitude to all of these referees. Without them, APEX could not have reached its present international reputation.

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Description of a new species of *Subzebrinus* (Gastropoda: Pulmonata: Buliminidae) from Java, Indonesia.

Bunjamin DHARMA

Jl. Tawakal VI/16, Jakarta -11440, Indonesia

KEY WORDS: Buliminidae, Indonesia, *Subzebrinus* n.sp.

ABSTRACT. A new species , *Subzebrinus (Subzebrinus) alticola* is described from West Java. It is compared with *Subzebrinus (Subzebrinus) batarae* (Rensch, 1930) from Lombok island.

INTRODUCTION

A species of *Buliminidae* with radial white streaks was collected in 1989 from Mount Ciremai, West Java. Its shell morphology is similar to species of the genus *Subzebrinus* Westerlund,1887, already known from Lombok Island (RENSCH, 1930, 1932). This genus is here recorded for the first time in Java.

Other members of *Buliminidae* already known in Java are: *Coccoderma (Coccoderma) glandula* (Mousson, 1848); *C. (C.) thrausta* (Moellendorff, 1897); *C. (C.) prillwitzi* (Moellendorff,1897); *C. (C.) tenuilirata* (Moellendorff, 1897) and *C. (C.) tenggerica* (Moellendorff, 1897) (VAN BENTHEM JUTTING, 1952).

Ovate conical to cylindrical conical shells of *C. (C.) glandula* (Figs 4-5) were collected at Sumber Rejo, Jember, East Java, on limestone area, at 35-75 m altitude. The shells are smaller, and are illustrated here with the common high conical form (Fig. 6).

Abbreviations

MZB - Museum Zoologicum Bogoriense, Bogor, Indonesia.

ZMA - Zoölogisch Museum, Universiteit van Amsterdam, Netherlands.

SMF - Forschungsinstitut Senckenberg, Frankfurt, Germany.

Subzebrinus (Subzebrinus) alticola n.sp.

Figs. 1-2.

Material studied

Pengasinan, Mount Ciremai 6°52' S - 108° 12' E: holotype, MZB Gst. 9615; 2 paratypes, MZB Gst. 9616; 2 paratypes, ZMA Moll. 3.95.018; 2 paratypes, SMF 311177; 2 paratypes, author's coll. Sangabuana, Mount Ciremai: 1 paratype (semi adult), author's coll. Collected by Heryianto Gordah.

Type locality

Pengasinan, Mount Ciremai, 2900 m, West Java, Indonesia, 6°52' S - 108°12' E, on tree.

Description

Shell highly conical, rather thin, shining, little or not transparent. Colour brown to dark brown, usually with irregular radial white streaks or smears, apex light brown. Sculptured by fine radial striae, indistinctly spirally arranged.

Whorls 6 to 6½, little convex, top obtuse, base rounded. Suture shallow or well impressed, often white margined. Umbilicus very narrow, columellar side hiding part of umbilicus.

Aperture oblique, oval; brown inside. Peristome not continuous, margins connected by a thin membrane. Free margin white or purplish, slightly thickened, little reflected with a narrow yellowish brown band behind peristome and parallel with it.

Dimensions: height 13.3 to 14.7 mm, diameter 5.9 to 6.4 mm; height of aperture 5.7 to 6.2 mm.

Distribution

Known only from Mount Ciremai, West Java: Pengasinan, 2900 m; Sangabuana, 2460m.

Habitat

On tree, part of them are hiding under barks up to 2 m.

Remarks

Compared with *Subzebrinus (Subzebrinus) batarae* (Rensch, 1930) from Lombok Island, the shell of *S. (S.) alticola* has more convex whorls and a relatively lesser number of whorls. The shell of *S. (S.) batarae* is red brown with yellowish streaks (RENSCH, 1930, 1932).

Etymology

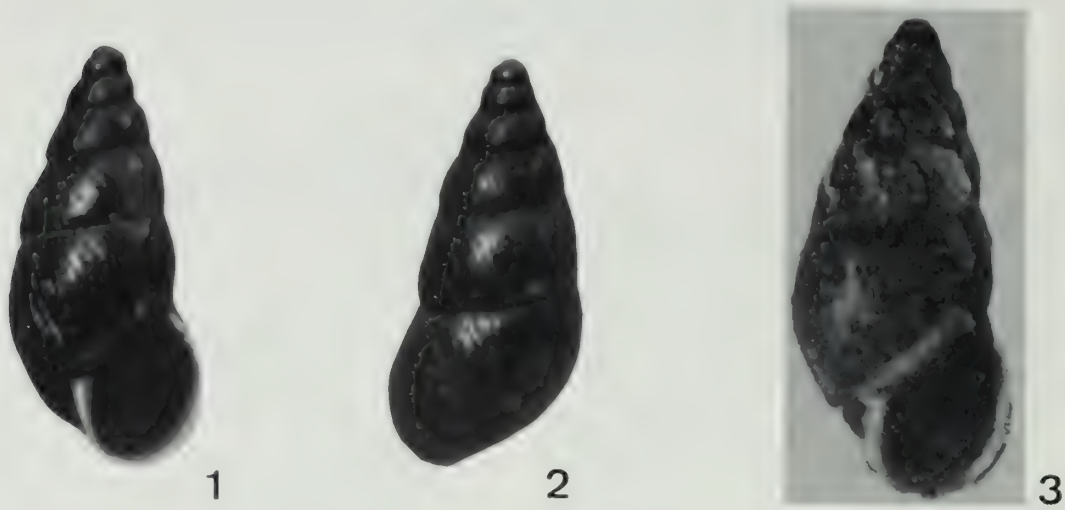
Named for its geographical range, situated at a high altitude.

REFERENCES

RENSCH V. B., 1930. Neue Land-Pulmonaten von den Kleinen Sunda -Inseln. *Zoologischer Anzeiger* 89 (3/4): 88.

RENSCH V. B., 1932. Die Mollusken - Fauna der Kleinen Sunda - Inseln Bali, Lombok, Sumbawa, Flores und Sumba II. *Zool. Jahrb., Jena*, 63 (1): 118 - 119.

VAN BENTHEM JUTTING W. S. S., 1952. III. Critical Revision of the Javanese Pulmonate Land-snails of the Families Ellobiidae to Limacidae, with an Appendix on Helicarionidae. *Treubia* 21(2): 366-373.



Figures 1-3. *Subzebrinus (Subzebrinus) alticola* n.sp.

1-2. Holotype, MZB (h = 14.4 mm); **3.** *S. (S.) batarae* (Rensch, 1930), (h = 13.5-15 mm), Segare Anak, Lombok, 2000 m. (fig. 16 from RENSCH, 1930).

Figures 4-6. *Coccoderma (Coccoderma) glandula* (Mousson, 1848).

4. Sumber Rejo, East Java, (h = 14.6 mm); **5.** Sumber Rejo, East Java, (h = 16.6 mm); **6.** Kalipare, East Java (h= 18.8 mm) (coll. B. Dharma).

Description of a new species of Muricopsinae (Gastropoda: Muricidae) from the Andaman Islands.

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KEYWORDS: Gastropoda, Muricidae, new species, Andaman Islands.

ABSTRACT. *Murexiella andamanensis* n.sp. is described. It is compared with *Murexiella interserratus* (Sowerby, 1879) and ?*Muricopsis* (?*Murexsul*) *multispinosus* (Sowerby, 1904).

RESUME. *Murexiella andamanensis* n.sp. est décrit et comparé à *Murexiella interserratus* (Sowerby, 1879) et à ?*Muricopsis* (?*Murexsul*) *multispinosus* (Sowerby, 1904).

INTRODUCTION

A shell which is illustrated as *Murexiella macgintyi* (M. Smith, 1938) in SUBBA RAO & SURYA RAO (1993: pl. 8, figs 1, 2, 3) caught the attention of one of the authors (RH). After careful examination of the specimens, it becomes evident that they belong to the genus *Murexiella*, although different from *Murexiella macgintyi*, a larger species (20-39 mm in length), from the western Atlantic, known from the Gulf of Mexico to southern Brazil (VOKES, 1994).

SYSTEMATICS

Genus *Murexiella*
Clench & Pérez Farfante, 1845

Type species, by original designation: *Murex hidalgoi* Crosse, 1869.

Murexiella andamanensis n.sp.

Figs 1, 3-6

Murex (Muricidea) cirrosus -SMITH, 1878: 806; MELVILL & SYKES, 1897: 170 (not Hinds, 1844).
Murexiella macgintyi - SUBBA RAO & SURYA RAO, 1993: 59, pl. 8, figs 1, 2, 3 (not Smith, 1938)

Material examined

Holotype n° M23658/4 and 1 paratypes n° M23659/4, Zoological Survey, India, Andaman Islands, off Ross Island, Port Blair, 5-6 fms (9-11 m); 4 paratypes n° M23659/4, Zoological Survey, India, 1 paratype R. Houart, Andaman Islands.

Type locality

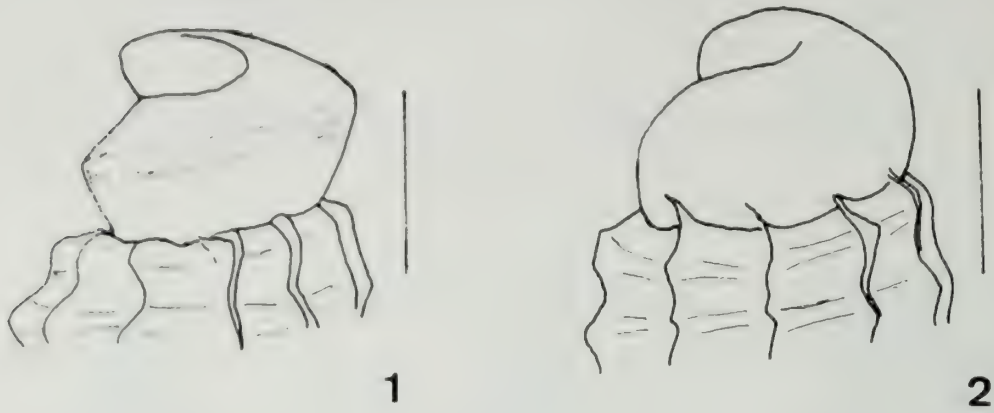
Andaman Islands, off Ross Id, Port Blair, 9-11 m.

Description

Shell up to 13.85 mm in length at maturity, frondose. Spire high, with 1.5-1.75 protoconch whorls, and up to 5 weakly shouldered teleoconch whorls. Last whorl broad. Suture obscured by small axial lamellae of following whorl. Protoconch strongly keeled, otherwise smooth (Fig. 1). Terminal varix heavy, raised.

Axial sculpture of teleoconch whorls consisting of high varices, each with short, frondose spines: 5 on varices of last whorl; 2 on early whorls. Shoulder spine longest. First teleoconch whorl with 9 varices, second with 11 or 12, third and fourth with 10 or 11, last whorl with 7 or 8. Spiral sculpture of low, broad, squamous cords, and numerous, narrow, squamous lirae. First whorls with 2 cords, last whorl with 5 cords.

Aperture small, roundly-ovate. Columellar lip flaring, smooth. Lip partially erect, adherent at adapical extremity. Anal notch shallow, broad. Outer lip weakly crenulate, with low, short lirae within. Siphonal canal relatively long, narrow, abaperturally recurved, open, with 2 rows of short spinelets.



Figures 1-2.

1. Protoconch of *Murexiella andamanensis* n.sp. (scale bar: 0.5 mm)

2. Protoconch of *Murexiella interserratus* (Sowerby, 1879) (scale bar: 0.5 mm).

Light tan, shoulder of last whorl weakly darker coloured.

Operculum and radula unknown.

Remarks

Murexiella interserratus (Sowerby, 1879), from Japan, is similar to *M. andamanensis*, but differs in its relatively larger shell with fewer axial ribs (8-10), globose, rounded protoconch (Fig. 2), and less fronded, longer varicial spines.

?*Muricopsis* (?*Murexsul*) *multispinosus* (Sowerby, 1904), a Japanese muricid, still of uncertain classification, also has a shell with long siphonal canal, but differs in having relatively, long, smooth, acute spines, 4 rows of numerous spines on the siphonal canal, and a rounded protoconch.

Murexiella andamanensis n.sp. also has been confused with *Murexiella cirrosa* (Hinds, 1844) by SMITH (1878), who noted that one of his specimens possessed an unusually long canal, and by MELVILL & SYKES (1897). *Murexiella cirrosa* is a different species, with large, elaborate axial varices, and a short siphonal canal.

Acknowledgements

We thank the Director of the Zoological Survey of India for the permission to use the material studied here.

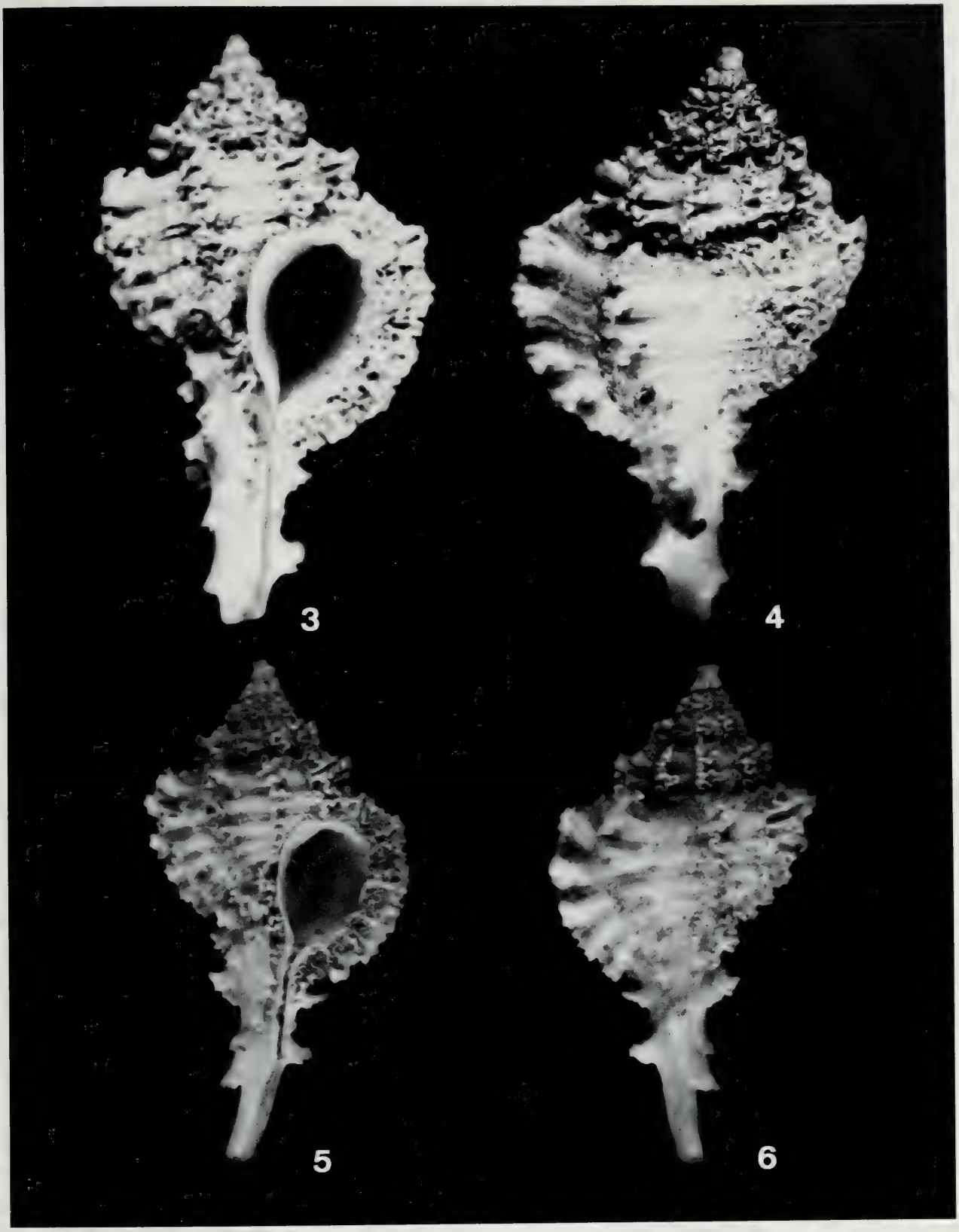
REFERENCES

MELVILL, J.C. & E.R. SYKES, 1897. Notes on a collection of the marine shells from the Andaman Islands. *Proc. Malac. Soc. Lond.*, 2: 164-172 & 220-229.

SMITH, E.A., 1878. On a collection of marine shells from the Andaman Islands. *Proc. Zool. Soc. Lond.*: 804-821.

SUBBA RAO, N.V. & K.V. SURYA RAO, 1993. Contribution to the knowledge of Indian marine molluscs. 3. Family: Muricidae. *Rec. Zool. Surv. India*, Occ. paper 153: 1-133.

VOKES, E.H., 1994. Cenozoic Muricidae of the western Atlantic region. Part X - The subfamily Muricopsinae. *Tulane Stud. Geol. Paleont.* 26 (2-4): 49-160.



Figures 3-6. *Murexiella andamanensis* n.sp.

3-4. Holotype ZSI n° M23658/4, Andaman Islands, off Ross Island, Port Blair, 9-11 m, 13.12 mm.

5-6. Paratype R. Houart, Andaman Islands, 12.2 mm.

Description of new species of Muricidae (Gastropoda) from New Caledonia, the Philippine Islands, the Northeast Atlantic, and West Africa

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KEYWORDS: Gastropoda, Muricidae, new species.

ABSTRACT. Five new species of Muricidae are described: *Poirieria (Actinotrophon) fragilis* from the New Caledonia region and Western Australia, *Dermomurex (Takia) gofasi* from the Northeast Atlantic, *Attiliosa ruthae* from the Philippine Islands, *Ocenebra (Ocenebra) chavesi* from the Azores, and *Pterotyphis ryalli* from Ghana. *Poirieria (Actinotrophon) actinophorus* (Dall, 1889) is reported for the first time from the Northeast Atlantic.

INTRODUCTION

Identification of material obtained from recent expeditions, new dredging methods, and unflagging attempts for a better understanding of supraspecific classification have led to the discovery of new geographical distribution for many species and to the description of numerous new taxa in the family Muricidae. More than 380 species have been named since 1973 (HOUART, 1994).

Five new species belonging to four different subfamilies are described here. They originate from different sources: *Poirieria (Actinotrophon) fragilis* was collected during Musorstom and Bathus cruises in the New Caledonia region, organized by ORSTOM and Muséum national d'Histoire Naturelle, Paris using the ORSTOM ship "Alis"; *Dermomurex (Takia) gofasi* was collected during the Seamount 2 expedition, also organized by MNHN, which visited the Meteor Group seamounts in the Northeast Atlantic, using IFREMER ship "Le Suroît" with funding of Centre National de la Recherche Scientifique; *Attiliosa ruthae* is a species from the Philippine Islands, the source of numerous, recently described new species; *Ocenebra (O.) chavesi* was collected some one hundred years ago in the the Azores; *Pterotyphis ryalli* from Ghana, West Africa, is a small and apparently rare species, few specimens have been collected since its discovery in 1977. It was confused with *P. pinnatus* (Broderip, 1833) by D'ATTILIO & HERTZ (1989).

Abbreviations

IRSNB: Institut Royal des Sciences Naturelles de Belgique, Bruxelles, Belgium.
MNHN: Muséum National d'Histoire Naturelle, Paris, France.
SMNH: Swedish Museum of Natural History, Stockholm, Sweden.
USNM: National Museum of Natural History, Washington, D.C., U.S.A.
DE: Drague épibenthique (Epibenthic Sledge)
DW: Drague Waren (Waren Dredge).
CP: Chalut à perche (Beam Trawl).
dd: empty shells.
lv.: live-taken specimen(s).

SYSTEMATICS

Family MURICIDAE Rafinesque, 1815
Subfamily MURICINAE Rafinesque, 1815
Genus *Poirieria* Jousseaume, 1880
Subgenus *Actinotrophon* Dall, 1902

Type species by monotypy: *Trophon actinophorus* Dall, 1889

Poirieria (Actinotrophon) actinophorus (Dall, 1889)

Figs 10-11

Boreotrophon actinophorus Dall, 1889: 206, pl. 15, fig. 2.

Type locality: off Santa Cruz (St Croix, Virgin Islands), 248 fms (454 m).

Material examined

Seamount 2, Great Meteor Bank, stn DE 140, 30°01.10' N-28°27.70' W, 308 m, 1 dd; stn DW 143, 30°09.90' N-28°18.10' W, 330 m, 2 dd; stn CP 144, 30°09.90' N-28°29.04' W, 335 m, 1 dd; stn DW 145, 30°11.40' N-28°28.50' W, 470 m, 1 dd; stn DW 152, 30°02.00' N-28°22.10' W, 470 m, 1 lv., 12 dd (8 juveniles); stn DE 157, 29°56.20' N-28°31.80' W, 290 m, 1 dd; stn DW 172, 30°05.10' N-28°41.50' W, 455 m, 1 dd; Hyères Bank, stn DW 184, 31°24.40' N-28°52.30' W, 705 m, 1 lv.; Irving Bank, stn DW 218, 31°52.30' N-28°03.60' W, 480 m, 2 lv.; stn DW 219, 32°01.00' N-27°53.30' W, 760 m, 2 lv.; stn DW 205, 32°01.10' N-27°57.20' W, 348 m, 1 lv.; stn DW 231, 32°01.50' N-27°54.50' W, 745 m, 6 lv., 6 dd (all MNHN).

Remarks

P. actiniphorus was reported alive, from different localities in the Caribbean Sea, and off Brazil, in depth from 256 to 774 m (DALL, 1889, BULLIS, 1964, BAYER, 1971, PAULMIER, 1994).

The specimens collected in the Northeast Atlantic were dredged, alive, from 290 to 760 m depth. The largest specimen is 14.8 mm in length, with 6 teleoconch whorls. The illustrated specimen (Fig. 12) is 13.5 mm in length, with 5.5 teleoconch whorls.

Poirieria (Actinotrophon) fragilis n.sp.

Figs 1-2, 5-9, 27-28

Type material examined

New Caledonia: **Musorstom 6**, stn DW 483, 21°20' S-167°48' E, 600 m, Bouchet and Richer de Forges, 23 February 1989, holotype MNHN (lv.). Paratypes: Biocal, stn CP 75, 22°19' S-167°23' E, 825-860 m, Bouchet, Métivier & Richer de Forges, 04 September 1985, 1 MNHN (dd); **Bathus 1**, stn CP 698, 20°34' S-164°57' E, 491-533 m, Bouchet & Richer de Forges, 17 March 1993, 3 MNHN; stn CP 702, 20°35' S-165°35' E, 591-660 m, 1 MNHN, **Bathus 4**, stn CP 948, 20°33' S-164°57' E, 533-610 m, Métivier & Richer de Forges, 10 August 1994, 1 NMNZ M272477 ; 1 NM L1857/T1361; 1 coll. R. Houart; 9 MNHN.

Other material examined

North West of Port Hedland, Australia (depth unknown), coll. R. Houart, (1 dd).

Distribution

New Caledonia and North West of Port Hedland, Australia; live collected in 610 m (New Caledonia).

Description

Shell delicate, up to 28 mm in length (Australian specimen, coll. R. Houart). Spire high, acutely conical with 1.5 protoconch whorls and 6 or 7 sharply angulate teleoconch whorls. Protoconch whorls rounded, smooth, glossy; terminal varix eroded, strongly curved, typical of *Poirieria*. Suture impressed. First and second teleoconch whorls with 6 or 7 lamellate varices; 7 or 8 varices from third to last teleoconch whorls. Varices produced into long, sharp, flattened, open shoulder spines, increasing gradually in length on next whorls. Aperture ovate, columellar lip rim entirely adherent. Anal notch indistinct. Outer lip thin, smooth within. Siphonal canal moderately long, open, weakly bent abaperturally. 2-4 previous canals retained. Milky white.

Radula (Fig. 27) with broad, sickle shaped lateral teeth. Rachidian with long central and lateral cusps, and short lateral denticles, similar to that of species of *Poirieria* sensu stricto (MARSHALL & HOUART, 1995).

Operculum (Fig. 28) ovate-elongate, with terminal nucleus.

Remarks.

This is the first record of a species of *Poirieria (Actinotrophon)* in the western Pacific, and the second known species. *Poirieria (Actinotrophon) fragilis* n.sp. is similar to *P. (A.) actinophorus* (Dall, 1889) from the Caribbean and the Northeast Atlantic (Figs 10-11), but the teleoconch whorls of *P. actinophorus* are smoother and higher with fewer axial lamellae, the aperture is narrower and more elongate, and the siphonal canal is broader.

Etymology

Named for the delicacy and fragility of the shell.

Dermomurex (Takia) gofasi n.sp.

Figs 3-4, 13-14, 29-30

Type material examined

Northeast Atlantic, Hyères Bank, SEAMOUNT 2, stn DW 182, 31°23.20' N-28°53.50' W, 480 m, Gofas, Métivier, Warén coll., 16 January 1993, holotype (lv.) and 3 paratypes MNHN, 1 paratype coll. R. Houart; stn DW 188, 31°30.00' N-28°59.50' W, 310 m, 17 January 1993, 1 paratype MNHN (dd); Irving Bank, stn DW 205, 32°01.10' N-27°57.20' W, 348 m, 25 January 1993, 1 paratype MNHN (dd).

Distribution

Northeast Atlantic, from 31°23.20' N, 28°53.50' W to 32°01.10' N, 27°57.20' W, in 310-480 m.

Description

Shell up to 18.75 mm in length at maturity, lightly built. Spire high, with 1.5-1.75 protoconch whorls and 6 broad, convex, weakly shouldered teleoconch whorls. Suture impressed. First teleoconch whorl with 6 high, strong, rounded varices, 7 on second and third, 6 or 7 on fourth, 6 on fifth and last whorls. Spiral sculpture, when intritacalx removed, of primary and secondary cords, and weak threads (Fig. 30). Aperture broad, roundly-ovate. Columellar lip flaring, smooth, rim partially erect, adherent at adapical extremity. Anal notch shallow, broad. Outer lip smooth, with 5 weak, low denticles within.

Siphonal canal short, narrow, straight, open.

Greyish-white, covered by a thick, relatively smooth, ivory-white or light tan intritacalx (Fig. 29). Aperture glossy white.

Operculum and radula unknown.

Remarks.

The subgenus *Takia* is actually known from five Recent species: *Dermomurex (Takia) africanus* Vokes, 1978, from South Africa, *D. (T.) bobyini* (Kosuge, 1984), from the Philippine Islands, *D. (T.) infrons* Vokes, 1974, from Japan and South Africa, *D. (T.) myrakeenae* (Emerson & D'Attilio, 1970), from Mexico, Eastern Pacific, and *D. (T.) wareni* Houart, 1990, from New Caledonia. In addition to that, there are several fossil forms in the Western Atlantic (VOKES, 1992), but they are rather different from *D. gofasi* n.sp. and do not need to be compared here.

This is the first record of a living *Takia* species in the Atlantic Ocean. Such a record was nicely predicted by VOKES (1992:80) who noted: "At this time there are no known species of *Takia* living in the Atlantic Ocean - but given the rate of discovery of new species of *Dermomurex* in the Caribbean of late, one may yet appear"...

Etymology

Named after Serge Gofas (MNHN), on board of R.V. "Suroît", during the SEAMOUNT 2 expedition.

Genus *Attiliosa* Emerson, 1968

Type species by original designation: *Coralliophila incompta* Berry, 1960

Attiliosa ruthae n.sp.

Figs 15, 31-32

Type material examined

Holotype MNHN, and 1 paratype coll. R. Houart, Cebu, Philippine Islands (lv.).

Distribution

Only known from the type locality, Cebu, Philippines, depth unknown.

Description

Shell up to 27.5 mm in length at maturity (holotype), heavy, weakly spinose. Spire high, acute, with 1.25 - 1.50 protoconch whorls, and up to 7 distinctly shouldered, teleoconch whorls. Suture adpressed. Protoconch small, whorls rounded, smooth.

Axial sculpture of teleoconch whorls consisting of high, narrow, spinose varices, each with one short, acute, adapically recurved shoulder spine. Last whorl with webbed varices and relatively shorter shoulder spines. Spiral sculpture of low, weak, nearly indistinct, smooth, primary and secondary cords.

Aperture broad, roundly-ovate. Columellar lip flaring, smooth, with 3 strong, small knobs abapically. Rim partially erect. Anal notch indistinct. Outer lip crenulate, with 8 weak denticles within. Siphonal canal short, narrow, strongly abaperturally recurved, open.

Light tan with darker coloured shoulder spines on 4 last whorls (holotype), or bluish white with milky white varices and aperture (paratype).

Operculum and radula unknown.

Remarks

Attiliosa ruthae n.sp. differs from *A. nodulifera* (Sowerby, 1841) (Fig. 16) and *A. caledonica* (Jousseaume, 1881) (Fig. 17) in having narrower varices, shorter, sharper, more adapically recurved shoulder spines, and fimbriate instead of spinose varices on the last whorl.

There are very few morphological differences in the shells of the numerous specimens of *A. nodulifera* that I examined throughout the years, and none of them had fimbriate varices and/or short, adapically pointed shoulder spines. Although fewer specimens of *A. caledonica* were examined, all of them also lack these particular features. The

genus was reviewed by VOKES & D'ATTILIO (1982).

Etymology

Named after Ruth Barbier, wife of Jean-Pierre Barbier, name proposed by Jean-Pierre, who provided the type material.

Subfamily OCENEBRINAE Cossmann, 1903
Genus *Ocenebra* Gray, 1847
Subgenus *Ocenebra* sensu stricto

Type species by monotypy: *Murex erinaceus* Linnaeus, 1758

***Ocenebra (Ocenebra) chavesi* n.sp.**
Figs 22-25

Type material

Holotype IRSNB IG 10591/474, Azores, San Miguel. Paratypes: 11 IRSNB; 1 coll. R. Houart (same locality) (lv. & dd); San Miguel, Ponta Delgada, 3 SMNH 4797; San Miguel, Ponta Delgada, 10-20 m, 1 MNHN; San Miguel, Ponta de Pirâmide, 13 m, 1 MNHN.

Distribution

San Miguel, Azores, depth unknown.

Description

Shell up to 21.42 mm in length at maturity, heavy, nodose. Spire high, acute, with 1.5 protoconch whorls, and up to 6 shouldered teleoconch whorls. Suture impressed. Protoconch ocenebrine, globose, whorls rounded, smooth.

Axial sculpture of teleoconch whorls consisting of high, rounded, squamous ribs: first whorl with 9 ribs, second with 10, third with 8-10, fourth with 7-9, fifth and last whorl with 6 or 7 ribs. Spiral sculpture of high, nodose, squamous, primary and secondary cords: 2 on first to third whorls, 3 on fourth and fifth, 5 on last whorl. Shoulder usually with 2 secondary cords.

Aperture ovate. Columellar lip smooth, adherent. Anal notch indistinct. Outer lip smooth. Siphonal canal short, narrow, straight, ventrally sealed.

Light tan to light brown. Aperture white.

Operculum and radula unknown.

Remarks

In the collection of P. Dautzenberg stored in the Institut Royal des Sciences Naturelles de Belgique, I located a sample of specimens of an unknown ocenebrine species labelled as "*Ocinebra chavesi* Dautz. mss, San Miguel, Cap. Chaves, 1895" and compared with the Western Atlantic *Murex nuceus* Mörch, currently refered to *Favartia* (Muricopsinae). The shell morphology is approximately similar to *F. nuceus*, but the sealed siphonal canal in *O. chavesi* clearly indicates a relationship with the Ocenebrinae.

The original lot also included a juvenile and a worn adult specimen of *Ocenebra erinaceus* (Linnaeus, 1758) (Fig. 26).

O. chavesi differs from *O. erinaceus* in its smaller absolute size at maturity and the size relative to the number of whorls, more strongly nodular sculpture, fewer spiral cords, more deeply channeled suture, and usually more rounded whorls.

Etymology

The name previously chosen by P. Dautzenberg is retained.

Subfamily TRIPTEROTYPHINAE
D'Attilio & Hertz, 1988
Genus *Pterotyphis* Jousseaume, 1880

Type species by original designation: *Typhis pinnatus* Broderip, 1833

***Pterotyphis ryalli* n.sp.**
Figs 18-20

Pterotyphis pinnatus -D'ATTILIO & HERTZ, 1989: 105, figs 1 & 2 [not *P. pinnatus* (Broderip, 1833)].

Type material examined

Holotype IRSNB IG 28292/473, and one paratype P. Ryall coll., Ghana, off Busua Island, under rocks, approximately 10 m depth (dd). Paratypes: Ghana, off Busua Id, under rocks, approximately 6 m depth, coll. R. Houart (dd); Ghana, off Busua Id, 15 m, coll. P. Ryall (dd); Ghana, Sekondi Bay (fragment), coll. P. Ryall; Ghana, Takoradi, coll. P. Ryall (lv.); Ghana, Busua Beach, near Abokwa Id, low tide, coll. E. Rolán (lv.).

Distribution

Ghana, West Africa, living at low tide.

Description

Shell up to 11.1 mm in length (paratype, P. Ryall). Spire high, up to 5 weakly convex, narrow, teleoconch whorls. Suture adpressed. Protoconch unknown.

Axial sculpture of teleoconch whorls consisting of three strong, narrow, lamellose varices. Other axial sculpture of numerous growth lamellae. Apertural varix more strongly developed. Short, spine-like, ventrally sealed

tube at shoulder immediately behind varix. Spiral sculpture of strong, smooth cords, and a few smooth threads: 2 or 3 cords on first and second whorls, 3 or 4 on third, 5 or 6 on fourth, 8 or 9 on last whorl. Shoulder with 2-4 narrow threads.

Aperture small, ovate. Columellar lip narrow, smooth, rim adherent. Anal notch indistinct. Outer lip weakly crenulate, smooth within. Siphonal canal short, broad, narrowly open.

Light tan, occasionally with darker coloured bands at shoulder and periphery.

Operculum and radula unknown.

Remarks

Pterotyphis pinnatus (Broderip, 1833) (Fig. 21) from the Western Atlantic is superficially similar, but differs in having a relatively larger, more strongly shouldered and broader shell, with narrower, more numerous spiral cords and threads, and thinner, more strongly fimbriate varicial wings.

The only other known Recent species of *Pterotyphis* is *P. fimbriatus* (A. Adams, 1854) from the Gulf of California and Mexico, Eastern Pacific.

Etymology

Named for Peter S. Ryall (Klagenfurt, Austria) who provided most of the type material.

Acknowledgements.

I am most indebted to the following people who provided the studied specimens: J.P. Barbier (Paris); P. Bouchet and S. Gofas (Muséum National d'Histoire Naturelle, Paris); E. Rolán (Vigo, Spain); P. Ryall (Klagenfurt), J. Van Goethem (Institut Royal des Sciences Naturelles de Belgique, Brussels), and A. Warén (Natural History Museum, Stockholm). I am also grateful to S.S. Greenhouse and the late R.S. Houbrick (National Museum of Natural History, Smithsonian Institution, Washington D.C.) for the loan of the paratypes of *Trophon actinophorus* and to A. Warén for radular preparation and SEM work. For critically reading the manuscript and comments, I thank B.A. Marshall (Museum of New Zealand, Wellington) and E.H. Vokes (Tulane University, New Orleans).

BIBLIOGRAPHY

BAYER, F.M., 1971. New and unusual mollusks collected by R/V *John Elliott Pillsbury* and R/V *Gerda* in the tropical Western Atlantic. *Bull. Mar. Sci.* 21: 111-236.

BULLIS, H.R., 1964. Muricidae (Gastropoda) from the northeast coast of South America, with descriptions of four new species. *Tulane Stud. Zool.* 11 (4): 99-107.

DALL, W.H., 1889. Reports on the results of dredgings, under the supervision of Alexander Agassiz, in the Gulf of Mexico (1877-78) and in the Caribbean Sea (1879-80), by the U.S. Coast Survey Steamer "Blake"... 29. Report on the Mollusca. 2, Gastropoda & Scaphopoda. *Bull. Mus. Comp. Zool.* 18: 1-492.

D'ATTILIO, A. & C.M. HERTZ, 1989. A note on *Pterotyphis pinnatus* (Broderip, 1833). *Festivus* 21 (&&): 105.

HOUART, R., 1994. Illustrated catalogue of Recent species of Muricidae named since 1971. Wiesbaden: 1-179.

MARSHALL, B.A. & R. HOUART, 1995. A review of the New Zeland Recent species of *Poirieria* Jousseaume, 1880 (Mollusca: Gastropoda: Muricidae) with description of a new species. *Nautilus* 118 (2): 27-33.

PAULMIER, G., 1994. Mollusques profonds des Antilles Françaises. *Xenophora* 68: 3-19.

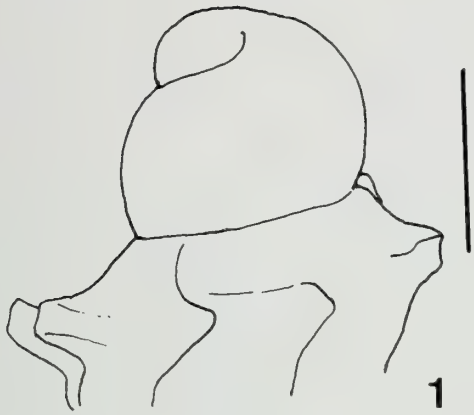
VOKES, E.H., 1992. Cenozoic Muricidae of the western Atlantic region. Part IX - *Pterynotus, Poirieria, Aspella, Dermomurex, Calotrophon, Acantholabia*, and *Attiliosa*; additions and corrections. *Tulane Stud. Geol. Paleont.*, 25 (1-3): 1-108.

VOKES, E.H. & A. D'ATTILIO, 1982. Review of the muricid genus *Attiliosa*. *Veliger* 25(1): 67-71

Figures 1-4 (*opposite page*).

1-2. Protoconch of *Poirieria (Actinotrophon) fragilis* n.sp. Holotype MNHN (scale bar 0.5 mm)

3-4. Protoconch of *Dermomurex (Takia) gofasi* n.sp. Holotype MNHN (scale bar 0.5 mm)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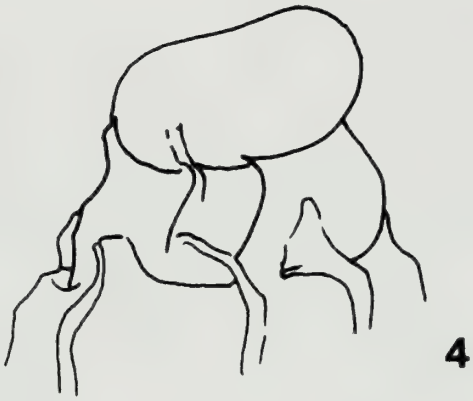
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Figures 5-9. *Poirieria (Actinotrophon) fragilis* n.sp. (*opposite page*).

5-6. Holotype MNHN, New Caledonia, Musorstom 6, stn DW 483, 21°20' S, 167°48' E, 600 m, 16 mm. **7-9**. Paratype MNHN, New Caledonia, Biocal, stn CP75, 22°19' S, 167°23' E, 825-860 m, 15.9 mm.

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Figures 10-14 (*opposite page*).

10-12. *Poirieria (Actinotrophon) actinophorus* (Dall, 1889).

10-11. Paratype USNM 87089. Blake Sta. 134, 248 fms (456 m), off Santa Cruz, 16.3 mm. **12**. Irving Bank, Northeast Atlantic, SEAMOUNT 2, stn DW 205, 32°01.10' N, 27°57.20' W, 348 m, 12.7 mm.

13-14. *Dermomurex (Takia) gofasi* n.sp. Holotype MNHN. Hyères Bank, Northeast Atlantic, SEAMOUNT 2, stn DW 182, 31°23.20' N, 28°53.50' W, 480 m, 18.8 mm.

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Figures 15-21 (*opposite page*).

15. *Attiliosa ruthae* n.sp. Paratype coll. R. Houart, Cebu, Philippine Islands, 26.8 mm.

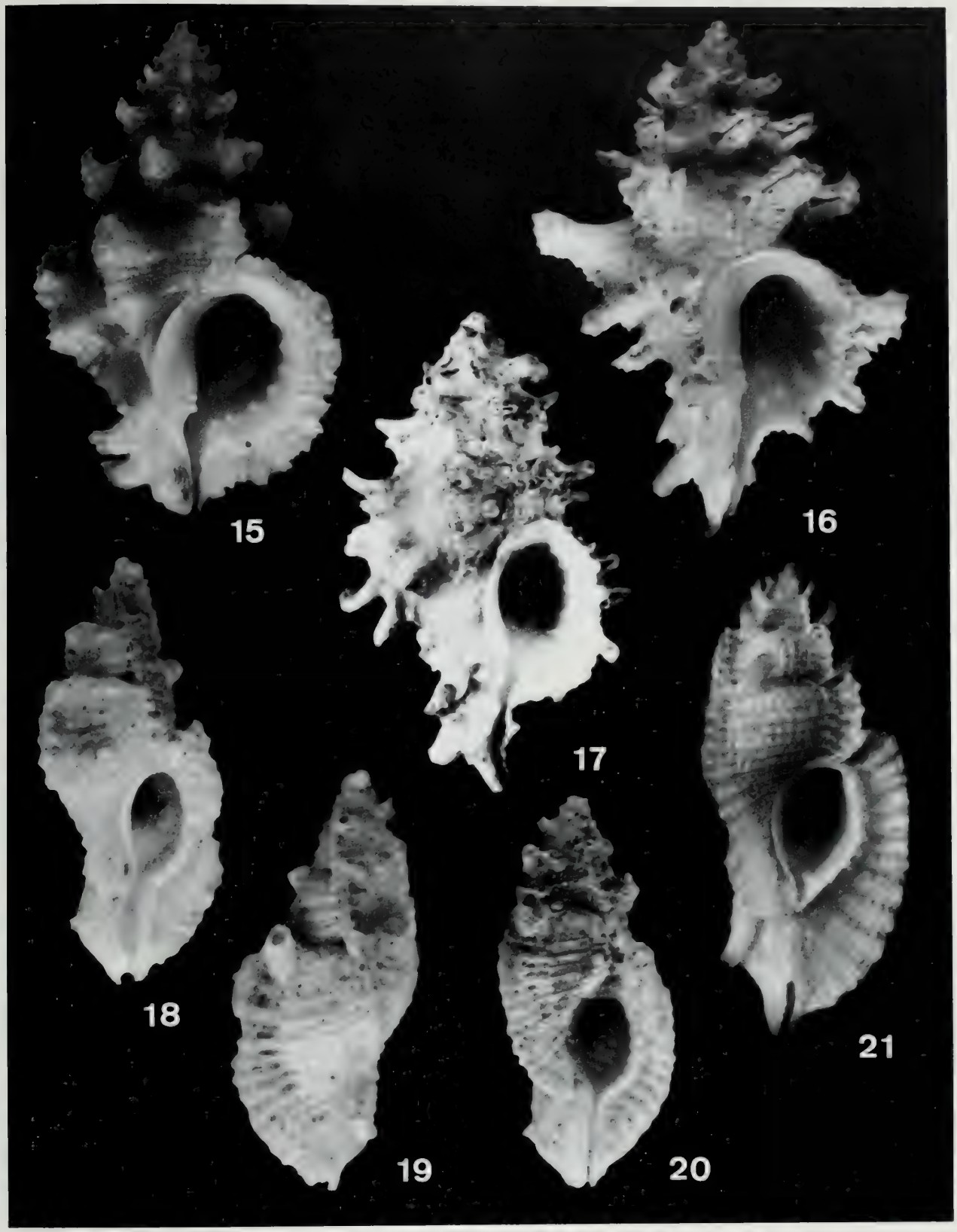
16. *Attiliosa nodulifera* (Sowerby, 1841), Punta Engaño, Philippine Islands, coll. R. Houart, 29.1 mm.

17. *Attiliosa caledonica* (Jousseaume, 1881), Tahiti, coll. M. Boutet, 37 mm.

18-20. *Pterotyphis ryalli* n.sp.

18-19. Holotype IRSNB IG 28292/473, Ghana, off Busua Island, 8.6 mm. **20**. Paratype coll. E. Rolán, Ghana, Busua Beach, near of Abokwa Island, 7.7 mm.

21. *Pterotyphis pinnatus* (Broderip, 1833), La Habana, Cuba, coll. R. Houart, 24 mm.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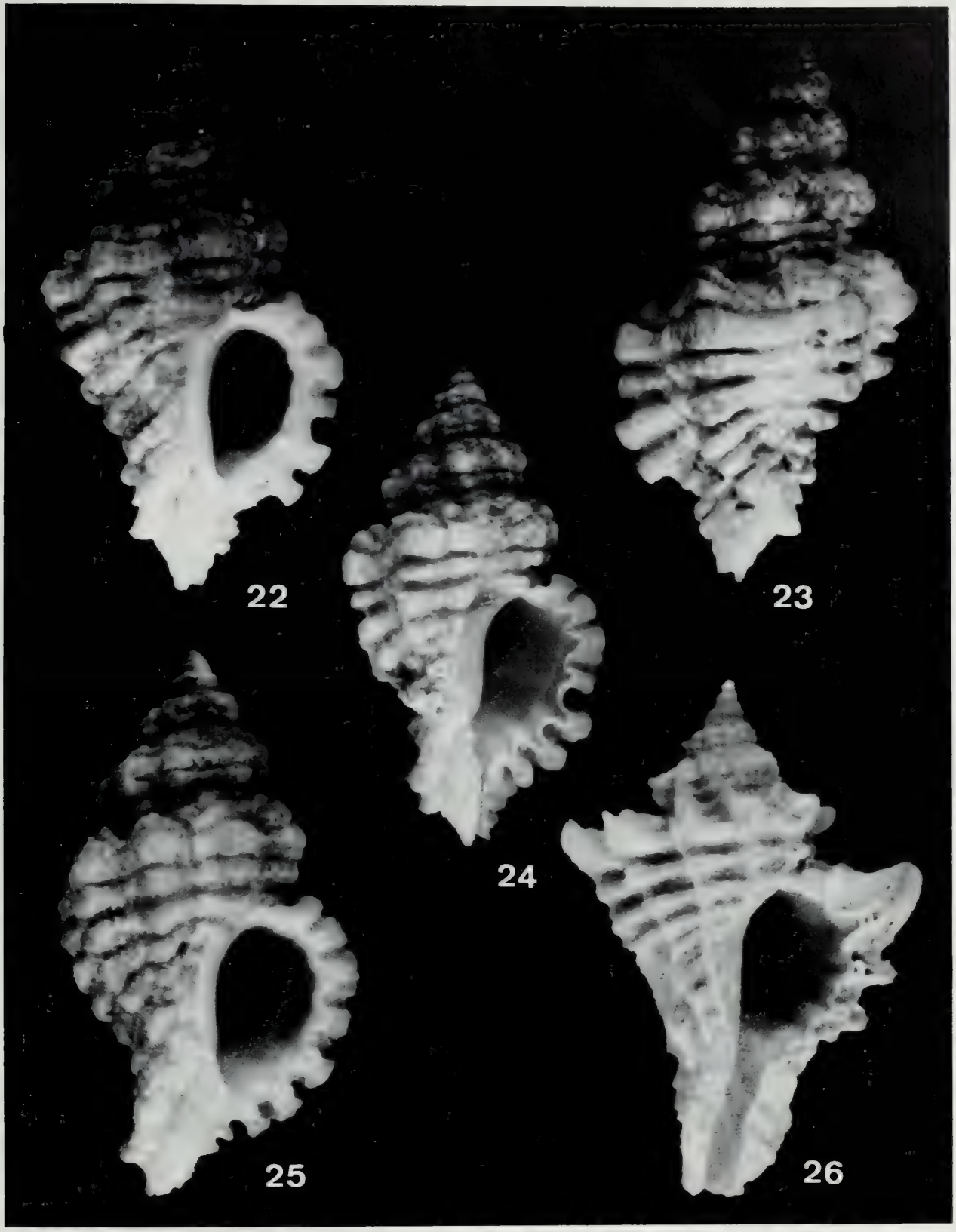
Figures 22-26 (*opposite page*).

22-25. *Ocenebra chavesi* n.sp., San Miguel, Azores

22-23. Holotype IRSNB IG 10591/474, 21.4 mm. **24**. Paratype IRSNB, 18.7 mm (subadult). **25**. Paratype IRSNB, 21 mm.

26. *Ocenebra erinaceus* (Linnaeus, 1758), IRSNB IG-10591, San Miguel, Azores, 20.4 mm (juvenile).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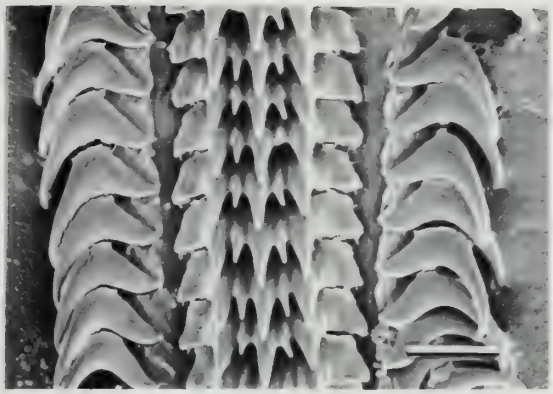
Figures 27-32 (*opposite page*).

27. Radula of *Poirieria (Actinotrophon) fragilis* n.sp., holotype MNHN, scale bar 50 μm. **28**. Operculum of *P. (A.) fragilis* n.sp., holotype MNHN, X 24. **29**. Detail of intritacalx of *Dermomurex (Takia) gofasi* n.sp., holotype MNHN. **30**. Detail of spiral sculpture of *D. (T.) gofasi* n.sp., paratype MNHN. **31-32**. *Attiliosa ruthae* n.sp. Holotype MNHN, Cebu, Philippine Islands, 27.5 mm.



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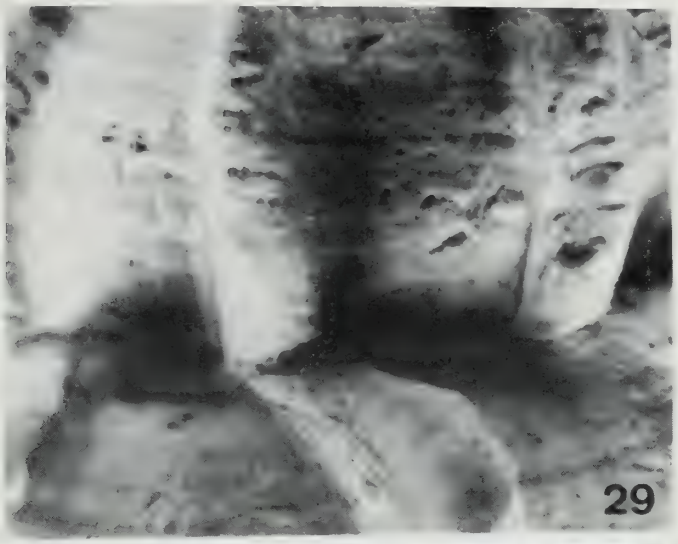

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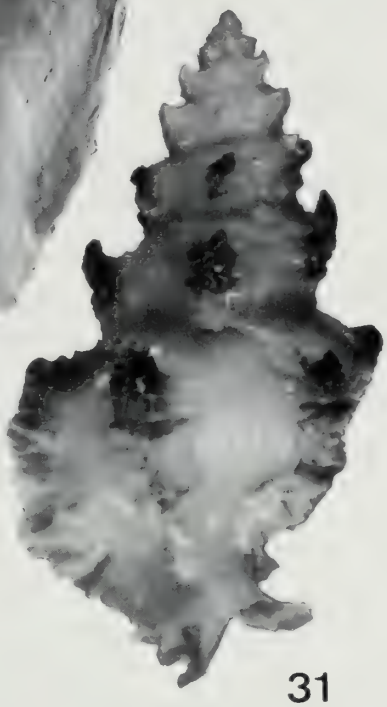

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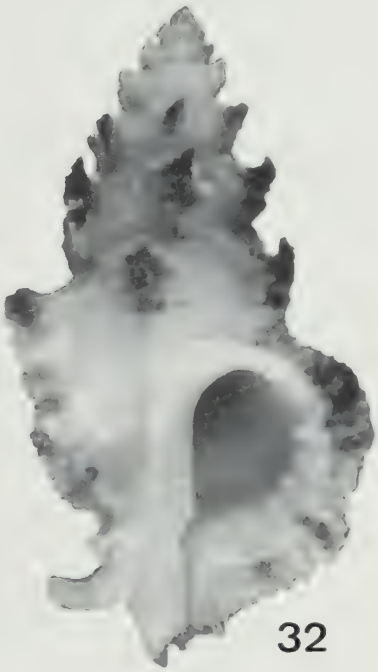

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A large Trachycardiinae from the Indo-West Pacific: *Vasticardium papuanum*, new species. (Mollusca, Cardiidae)

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KEYWORDS: Mollusca, Bivalvia, Cardiidae, *Vasticardium*, new species.

ABSTRACT. *Vasticardium papuanum* is a large (maximum 96.5 mm high) Trachycardiinae currently known by five Recent specimens from Papua New Guinea, Solomon Is., the Moluccas and the Philippines, and by numerous fossil shells in the Neogene of Niue (Cook Is.). It is close to *Vasticardium orbita*, with which it shares several characters, but differs by rib morphology and hinge.

RESUME. *Vasticardium papuanum* est un grand Trachycardiinae (maximum 96,5 mm de hauteur) actuellement connu par cinq spécimens récents de Papouasie-Nouvelle-Guinée, des îles Salomon, des Moluques et des Philippines, et par de nombreuses coquilles fossiles dans le Néogène de Niue (îles de Cook). Il est proche de *Vasticardium orbita*, avec qui il a plusieurs caractères en commun, mais en diffère par la morphologie des côtes et la charnière.

MATERIAL AND METHODS

Five Recent specimens, all selected as types, come from the following Museums:

IRSNB: Institut Royal des Sciences Naturelles de Belgique, Bruxelles.
MNHN: Muséum National d'Histoire Naturelle, Paris.
ZMA: Zoologisch Museum, Amsterdam.
WAM: Western Australian Museum, Perth.
Fossil material is in :
UGML: University of Guam Marine Laboratory, Mangilao, Guam. I have examined three complete valves an several fragments.

Rib morphology is a primordial element for specific identification. For examination, the shells are divided externally into four radial "quarters": AQ: Anterior Quarter; MAQ: Medio-Anterior Quarter; MPQ: Medio-Posterior Quarter; PQ: Posterior Quarter. The rib morphology changes from a quarter to another. Two parts are also schematically considered in each shell: a "juvenile" part near the umbo, of variable length, and a larger "adult" part following the latter until the ventral margin. The rib morphology progressively changes from one part to the other.

Abbreviations used are also: H= Height, L= Length, W= Width.

SYSTEMATICS

Family CARDIIDAE Lamarck, 1809
Subfamily TRACHYCARDIINAE Stewart, 1930

Genus *Vasticardium* Iredale, 1927.

Type species: *Cardium elongatum* Bruguière, 1789, by original designation (Iredale 1927: 75).

Diagnosis

Shell medium to large-sized, ovoid and symmetrical to assymmetrical and posteriorly expanded, obliquely or not, "winged" or truncated. Variably but moderately elongated and inflated. Mean rib number small to medium, range 30-42, exceptionally 45. Hinge line moderately angled. Cardinal teeth in right valve separated or merely touching at their base and never connected by a high and narrow dorsal saddle. In juvenile median and anterior parts, ribs becoming quickly high, square sided and fully ornamented, directely following millimetric smooth very primitive shell. In PQ, ribs always high and square-sided in juvenile shells, always simple, not divided into two parts; top scales or nodules always arranged in a single row along the apex. In other quarters of adult shells, ribs generally high, often squared

and overhanging interstices, rarely triangular, often bearing scales or tubercles in MPQ with crenulated margins, cross-bars in anterior half. Interstices rather deep and wide, with a flat bottom, smooth or finely striated independently from flanks of ribs, never notched or hollowed.

Remark

In previous papers (VIDAL, 1991, 1993), I used provisionally the genus *Acrosterigma* Dall, 1900, for species belonging to the same genus as the one described here. But now I think that the genus *Vasticardium*, as defined above, is more appropriate.

Vasticardium papuanum sp. nov.
Figs. 1-7.

Types

Holotype MNHN, Kale Bay, Western Manus Is., Admiralty group, Papua New Guinea, collected by Mr K. Silva, coll. Vidal. **Paratype No 1** MNHN, Philippines (?), no other data (found in Manila shop), coll. Vidal. **Paratype No 2** IRSNB IG26132, Hansa Bay, Laing Is, S. reef, Papua New Guinea, dredged 15 m, coll. Tursch & Pierret. **Paratype No 3** ZMA, Moluccas, coll. F. von Heukelom. **Paratype No 4** WAM 38-95, San Cristobal, Kira-Kira, Solomon Is., 161° 55' E - 10° 27' S, coll. B. R. Wilson.

Description

Shell reaching 96.5 mm in height. Practically equilateral and not elongated. Presence of a small posterior "winging" in the holotype and paratypes No 1 and 4. Tendency to the expansion of the shell limited to the MPQ particularly marked in the paratype No 3, and some fossil specimens.

Lunule rather large and well delineated, with the raised margins of the shell forming like a double wall in its axis.

External colour rather uniform, except in the juvenile part: red-brown in the holotype and paratypes No 2 and 4, light brown in the paratype No 1 and whitish in the paratype No 3. Internal margin vividly coloured, except for the paratype No 3 which is hardly tinted.

Number of ribs 37-39 in the Recent specimens, 34-36 in the fossils.

Rib morphology

PQ: In the young shells, the ribs, square-sided, have a particular sculpture (Fig. 6) with large, a little twisted, oblique scales disposed in the posterior half of the ribs, and intercalated with small crenulations in the posterior flank of the ribs, and more numerous anterior small scales or crenulations on the anterior edge. In the adult shells, the ribs flatten and even become concave, the interstices become extremely narrow; the large posterior scales become smaller, more numerous, less regular, then turn into a cicatricial ridge, separated on the rib by a furrow. The anterior scales disappear or become very lamellated and slanted, or form a small riblet.

MPQ: The sculpture of the young shell is constant: ribs more or less flatly rounded or slightly triangular with crenulations on both sides, which tend to join across the top and form transverse rugae; interstices separated from the ribs and striated. In adult shells the MPQ zone is very variable from one specimen to another, and also according to the position of the rib in the quarter: the ribs can be flatly rounded (holotype), to asymmetrically triangular (posterior side shorter). Interstices narrow but generally well delineated by a slight overhanging of the ribs; they are rather irregularly, strongly striated (about 30 striae per centimeter at a distance between 3 and 4cm from the umbo, versus about 60 in the *Vasticardium orbita* group.

The posterior crenulations can remain, become longer and form rugae on the flank, or disappear. The anterior crenulations can also disappear or become very long and slanting, or can form a very small pseudo-rib (particularly in the Niue fossils). The top zone of the ribs can be smooth (like in the holotype and paratype No 3) or bear additional tubercles or oblique scales equivalent of the main scales of the PQ. Sometimes, in the very adult part, particularly in the Niue fossils, the long posterior rugae issued from the crenulations reinforce when reaching the top and form tubercles on the triangular crest, and sometimes a double ornamentation with the also reinforced more marginal part of the rugae. The figures illustrate the progressive variability of the adult MPQ, from smoothest in paratype No 3 (Figs. 3-4) to most ornamented in Niue fossils.

MAQ and AQ: Ribs becoming somewhat square-sided, and ornamented with regular, slightly curved, transverse rugae, rarely forming a well characterized herringbone structure.

Measurements:

see Table 1.

	Height (mm)	Length (mm)	Width (mm)	L/H	W/L	Ribs
Holotype, MNHN (Figs. 1-2)	83.1	72.2	53.0	0.87	0.73	37
Paratype No 1, MNHN (Fig. 6)	75.0	63.1	47.8	0.84	0.76	38
Paratype No 2, IRSNB	61.4	53.3	38.3	0.87	0.72	39
Paratype No 3, ZMA (Figs. 3-4)	96.5	81.4	57.0	0.84	0.70	39
Paratype No 4, WAM	74.8	65.0	44.5	0.87	0.68	37
Niue fos. reef 1, UGML	85.8	71.2	(56.0)	0.83	0.79	36
Niue fos. reef 1, UGML (Fig. 7)	81.4	63.0	(52.0)	0.77	0.82	34
Niue fos. reef 2, UGML (Fig. 5)	50.5	41.4	(32.0)	0.82	0.77	35

Table 1. Measurements.

Remarks

The shell figured by VOSKUIL and ONVERWAGT (1991: pl. 3, fig. 10) as *Trachycardium enode* (Sowerby, 1840), reported as coming from Solomon Is., may belong to this species (specimen not seen). *Vasticardium papuanum* mainly differs from *Vasticardium elongatum enode* by its characteristic PQ, by the presence of ornaments on top and margins of ribs in the MPQ (smooth in *enode)* and by its striated interstices (smooth in *enode).*

The rib morphology of *V. papuanum* in MPQ and mainly in PQ (Fig. 6) is very characteristic, and similar elaborate features are never observed in any other Trachycardiinae. This species resembles *V. orbita* (Broderip & Sowerby, 1833) as far as general shape, lunule, internal colours, sculpture of the ribs of adult shells in anterior half and striated interstices are concerned. It differs by its uniform external colour, the sculpture of the juvenile shells (presence in the PQ of secondary marginal small scales or crenulations, ribs not smooth on the top in the three other quarters), the sculpture of the MPQ in the adult shells (with often double ornamentation), its more roughly striated interstices even in adult shells, and its hinge with no "hooked" and pointed basement of the basement of the anterior teeth, which is always rounded and not prominent. This latter macroscopic character is very distinct from *V. orbita*. It is interesting to note that in Niue Is. both species are found in the same deposits, and are also sympatric today in Hansa Bay (Papua New Guinea).

Acknowledgements

I am especially grateful to Dr. P. Bouchet and Dr. B. Métivier (Muséum National d'Histoire Naturelle, Paris) for their help in many ways. I am also indebted to Dr. J. Van Goethem and Dr. C. Massin (Institut Royal des Sciences Naturelles de Belgique), to Mr. R. Moolenbeek (Zoologisch Museum, Amsterdam), to Ms. S. Slack-Smith (Western Australian Museum, Perth) and to Dr. G. Paulay (University of Guam Marine Laboratory, Mangilao, Guam) for information , loans and visits.

REFERENCES

IREDALE, T., 1927. New Molluscs from Vanikoro. *Rec. Aus. Mus.* 16(1): 73-78.

VIDAL, J., 1991. *Cardium angulatum* Lamarck, 1819: a misinterpreted synonym of *Cardium alternatum* Sowerby, 1840. *J. Malac. Soc. Aust.*, 12: 57-61.

VIDAL, J., 1993. Variability of *Acrosterigma elongatum*, a polytypic species (Mollusca, Cardiidae). *J. Malac. Soc. Aust.*, 14: 41-58.

VOSKUIL, R.P.A. & W.H.J. ONVERWAGT, 1991. The taxonomy of the genus *Trachycardium* (Part 1) with description of three new species (Mollusca, Bivalvia). *Vita Marina*, 41(2): 56-72.

Figures 1-7 (*opposite page*).

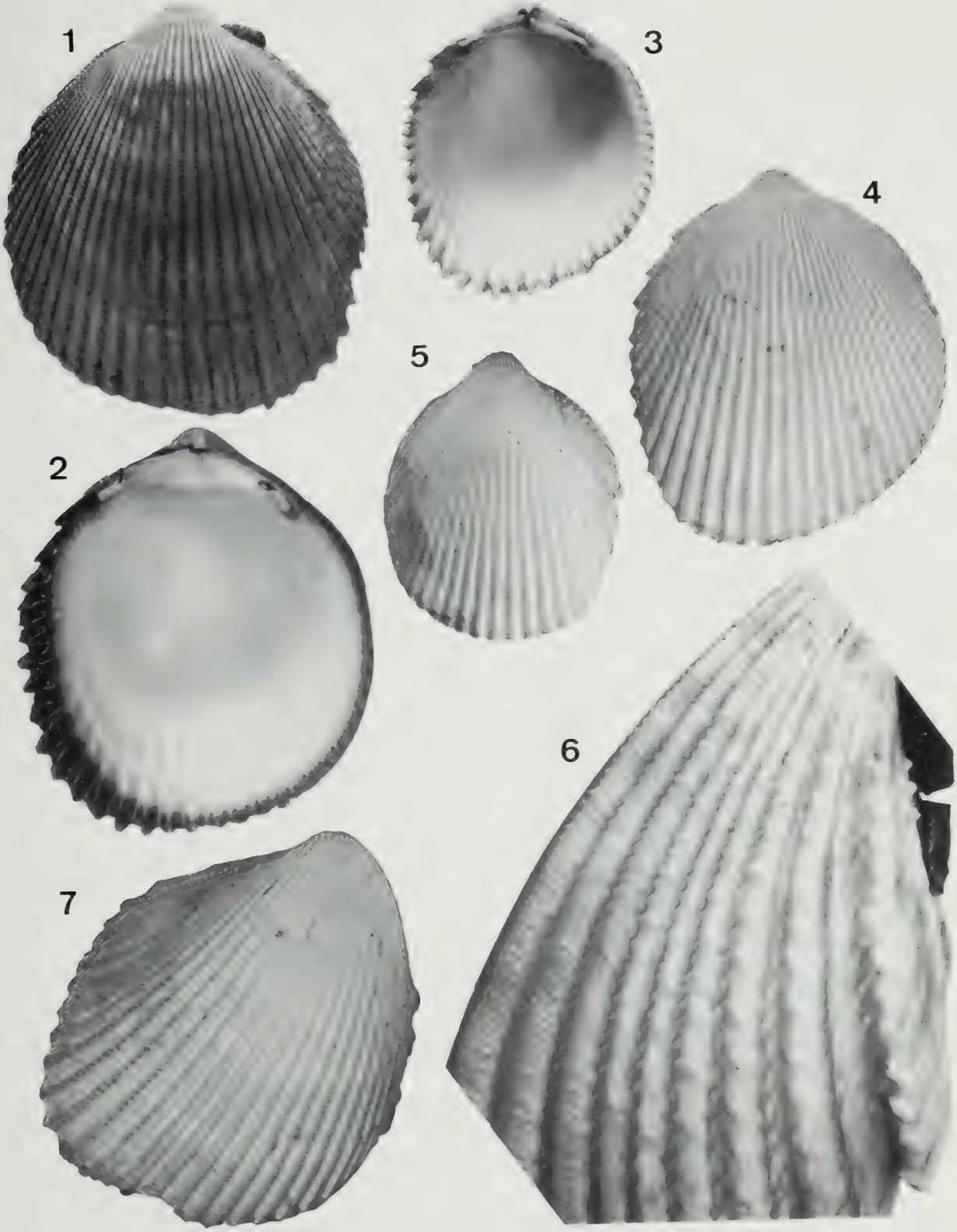
1-2. Holotype of *Vasticardium papuanum*. MNHN, ex coll. Vidal. L=72.2 mm.

3-4. *Vasticardium papuanum*, paratype No 3. ZMA, ex coll. von Heukelom. L=81.4 mm.

5. *Vasticardium papuanum*, from the Mio-Pliocene of Niue Is. UGML, ex coll. Paulay. L=41.4 mm.

6. *Vasticardium papuanum*, paratype No 1: detail of the rib morphology in juvenile PQ and three ribs of MPQ. Scale= x 3.5.

7. *Vasticardium papuanum*, from the Mio-Pliocene of Niue. UGML, ex coll. Paulay. L=63.0 mm.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A new species of *Mitra* from deep water off South Africa (Gastropoda: Prosobranchia: Mitridae)

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and

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KEYWORDS: Mollusca, Gastropoda, Prosobranchia, Mitridae, *Mitra*, taxonomy, South Africa.

ABSTRACT. *Mitra brinkae* n. sp. is described from the outer edge of the continental shelf off south-eastern Africa. It is compared to the South African species *Cancilla meyeriana* Salisbury, 1992, and to the Southern Australia species *Mitra glabra* Swainson, 1821, and *Mitra declivis* Reeve, 1844. Superficial similarities to the Australian fossil species *Eumitra alokiza* Tenison-Woods, 1880, are examined. The specimen recorded from South Africa by BARNARD (1959) as *Mitra subulata* Lamarck, 1811 [= *Vexillum costatum* (Gmelin, 1791)] is not referable to that species, but is probably a very worn example of *Cancilla meyeriana*.

INTRODUCTION

Several new deep-water mitriform gastropods have recently been dredged off South Africa, largely during the Natal Museum dredging programme. Some of these new species exhibit sculptural similarities to both recent and fossil mitrids.

SYSTEMATICS

Family MITRIDAE Swainson, 1831
Subfamily MITRINAE Swainson, 1831

Genus *Mitra* Lamarck, 1798

Type species (by subsequent designation) *Voluta mitra* Linnaeus, 1758, Recent, Indo-Pacific.

Mitra (Mitra) brinkae n. sp.

Figs 1-3, 5

Type material

Holotype (figs 1-2, 5) Natal Museum C8648/T854, off Whale Rock (lat 32° 02.9'S, long 29°19.7'E.), Transkei, South Africa, sand and shell rubble 250-280 m; Natal Museum Dredging Programme, 3/vii/85. Paratype 1 (fig. 3): Natal Museum S9068/T865, trawled off north coast of Natal, January, 1981, don. Mrs Dawn Brink. Paratype 2: trawled (or possibly *ex pisce*) off north coast of Natal, March, 1991; Dawn Brink collection.

Description

Shell of moderate size, fusiform, spire acuminate, aperture length less than half that of total length. Protoconch unknown; teleoconch of 7-9 whorls. Whorls slightly convex in profile, periphery median; sutures sharply defined and fairly deep. Superficially almost smooth, first 5-6 whorls sculptured with 5 shallow, punctate spiral grooves, becoming obsolete by 5th or 6th whorl; subsutural sculpture consists of very fine pliculate riblets (fig. 5); body whorl appears smooth but under microscopic examination, fine axial riblets (little stronger than coarse growth lines) are seen to radiate from suture onto body whorl. Inner lip of aperture with 4-5 thin columella folds; outer lip smooth within. Pale flesh-colour with occasional faint, diffuse, yellowish-brown longitudinal bands and streaks. Multiple repair scars are present on all specimens seen.

Dimensions: 46.0 x 11.0 mm, aperture length 21.0 mm (holotype); 45.0 x 10.5 mm, aperture 20.0 mm (paratype 1); 53.4 x 12.0 mm, aperture 23.9 mm (paratype 2).

Range

Outer continental shelf of south-eastern Africa, from Zululand to north-eastern Transkei.

Habitat

Sand and shell rubble in about 250-280 metres (only dead shells seen).

Figures 1-6. (*opposite page*)

1-3. *Mitra brinkae* n. sp. 1-2, Holotype NMSA C8648/T854, 46.0 x 11.0 mm. 3, Dorsal view of paratype 1, NMSA S9068/T865, 45.0 x 10.5 mm.
4. *Cancilla meyeriana* Salisbury, 1992, holotype, NMSA D1536/T723, 42.0 x 10.5 mm.
5-6. Sculpture on early whorls of 5, *Mitra brinkae*, holotype, and 6, *Cancilla meyeriana*, holotype.

Remarks

Mitra brinkae is characterised by its narrow shell, rather short aperture and nearly obsolete sculpture on its later whorls, save for fine axial plicules below the suture (see Fig. 3 in particular). Only the Australian Pliocene fossil species, *Eumitra alokiza* Tenison-Woods, 1880 (Fig. 9) seems to be superficially comparable in general sculptural features, but is, in fact, sculptured with fine, shallow but distinct spiral grooves over the entire shell. *M. brinkae* could also be confused with the Southern Australia species, *Mitra glabra* Swainson, 1821 (Fig. 10), which, however, is larger, wider and sculptured with shallow spiral grooves which are often stained dark brown; the ground colour in *Mitra glabra* is tan, marked with longitudinal streaks of brown, which normally follow growth lines; in some specimens the spiral grooves are finely punctate. *Mitra declivis* Reeve, 1844 (Fig. 11), believed by some to be a "smooth" form of *M. glabra*, is similarly sculptured with very shallow spiral grooves, but unlike *M. glabra* these grooves are not coloured; *M. declivis* also lacks the brown longitudinal streaks found in *M. glabra*. Both species lack the subsutural plicules of *Mitra brinkae*.

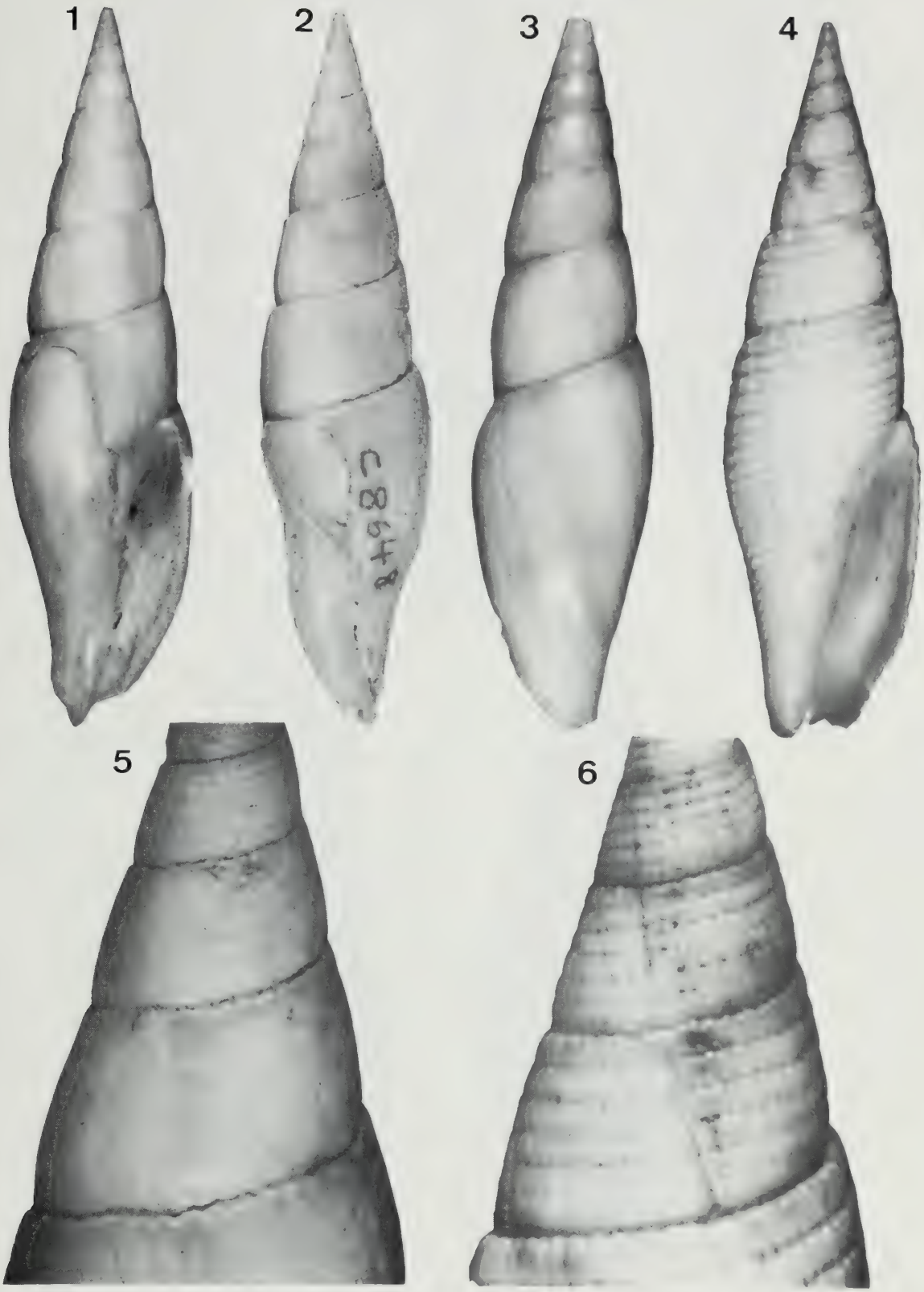
Of southern African mitrids the recently described *Cancilla meyeriana* Salisbury, 1992 (Fig. 4, holotype), is similar in size and occurs in the same general area. *Mitra brinkae* differs in being much smoother, without any sign of spiral cords on the body whorl. The early whorls bear somewhat similar spiral sculpture in both species (see Figs 5-6), but in *M. brinkae* this is not crossed by distinct axial pleats, which in *C. meyeriana* give the lirae a "segmented" appearance.

It is relevent to comment on the badly worn shell (Fig. 7), dredged off O'Neil Peak [= Neill Peak or Cunge (Zululand)] in 90 fathoms [=164 m], which was recorded by BARNARD (1959: 50, text fig. 13a) as *Mitra (Callithea) subulata* Lamarck, 1811. The same specimen (South African Museum A8763) was illustrated by KENSLEY (1973: text fig. 672). This shows some resemblance to *Mitra brinkae*, but the retention of distinct spiral sculpture on the base of the body whorl is more indicative of *Cancilla meyeriana*. Although its identity is somewhat academic, it is certainly not referable to Lamarck's taxon. Lamarck's original description of *M. subulata* cited SCHRÖTER (1783: pl. 4, Fig. 27), as possibly illustrating his species; the species figured there has never been positively identified and it could be either a ribbed mitrid or a costellarid. However, Cernohorsky reviewed Lamarck's species of Mitroidea and illustrated (CERNOHORSKY, 1969: 972, pl. 4, fig. 27) the holotype of *Mitra subulata* from the Lamarck collection in the Museum d'Histoire Naturelle, Geneva. This demonstrates that *Mitra subulata* is the Indo-Pacific species now known as *Vexillum (Costellaria) costatum* (Gmelin, 1791). GMELIN (1791: 3458) in fact cited the same Schröter figure for his *Voluta costata*. The range of *Vexillum costatum* (Fig. 8) extends to the coral coast of northern Mozambique (Natal Museum collection H449 from Conducia Bay, and K3364 from Nacala). However, this species differs widely from *Mitra brinkae* in having closely-spaced but well-developed axial ribs, and in other characters.

Mitra brinkae appears to be rare, and no living examples are known. One of the three types (paratype #1) is malformed, with a peculiar curve to the spire resembling that found in some species of the buccinid genus *Colubraria* Schumacher, 1817. Although at least one of the types may have been taken from the gut of a fish, the dredged/trawled origin of the others shows that the smooth surface is not the result of action by digestive juices. Nor is there any sign of the overall pitting and loss of microsculpture that would be caused by such digestion.

Etymology

Named in honour of Mrs Dawn Brink of Westville, South Africa, for her contributions to the study of deep-water mitrids from South Africa.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Figures 7-11. (*opposite page*)

7. ?*Cancilla meyeriana*, worn specimen recorded from Zululand by Barnard (1959) as *Mitra subulata* (*non* Lamarck, 1811), South African Museum A8763, 25.2 x 7.8 mm.
8. *Vexillum costatum* (Gmelin, 1791), Natal Museum H449, Conducia Bay, Mozambique, K. Grosch, 46.6 x 9.9 mm.
9. *Eumitra alokiza* Tenison-Woods, 1880, Miocene of Victoria, Australia, 43.0 x 10.0 mm.
10. *Mitra glabra* Swainson, 1821, Smokey Bay, Southern Australia, 63.0 x 17.0 mm.
11. *Mitra declivis* Reeve, 1844 [=?*Mitra glabra* Swainson, 1821], Australia (locality Unknown), probably Southern Australia, 46.0 x 14.5 mm.

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REFERENCES

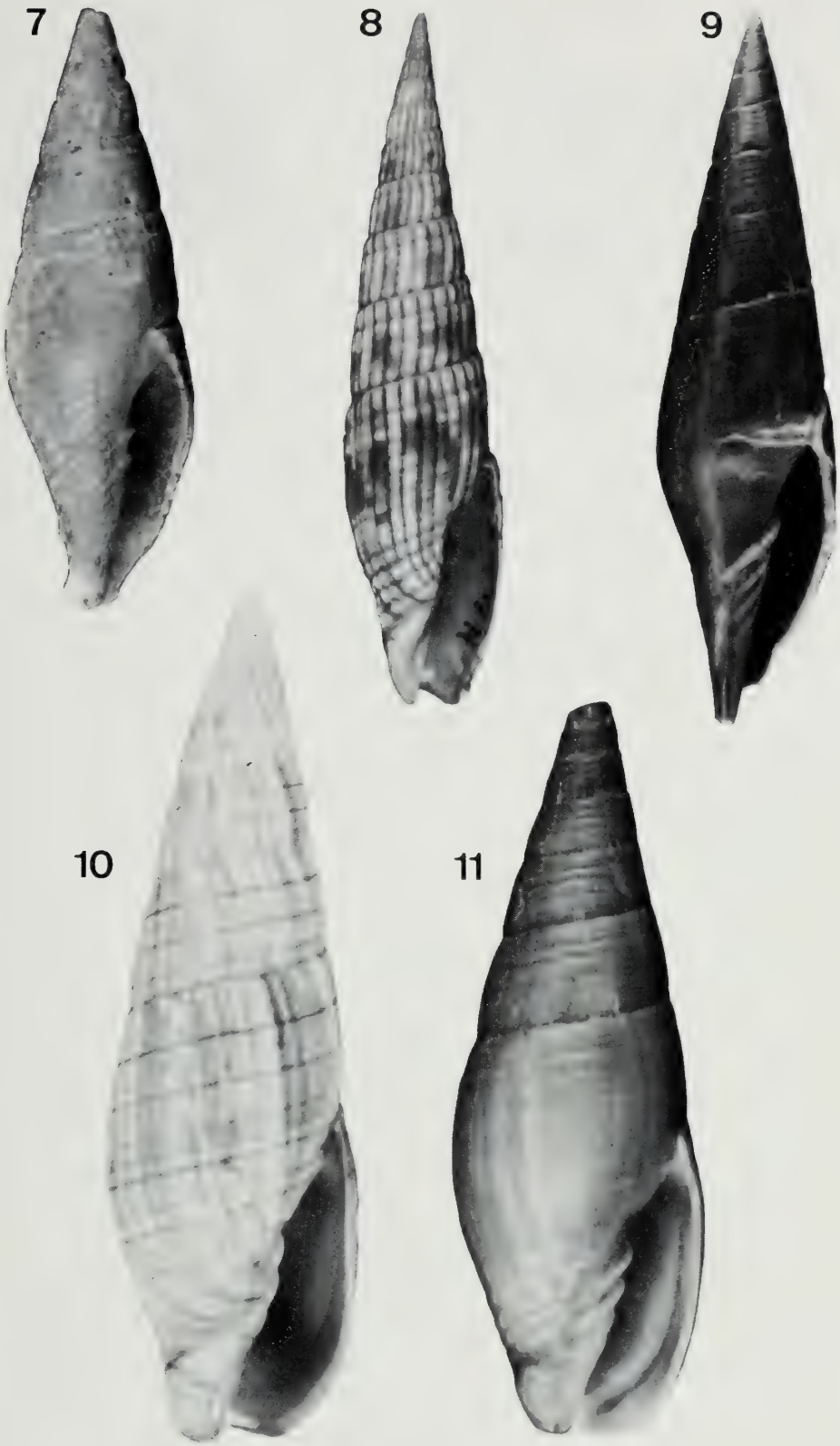
BARNARD, K. H. 1959. Contributions to the knowledge of South African marine Mollusca. Part II. Gastropoda: Prosobranchiata: Rhachiglossa. *Annals of the South Africa Museum* 45 (1): 1-237.

CERNOHORSKY, W. O. 1969. The types of the Lamarck collection in the Museum d'Histoire Naturelle in Geneva. Recent Mollusca of the genera *Mitra*, *Columbella* (part) and *Cancellaria* (part). *Revue Suisse de Zoology*. 76 (4): 953-994, pls 1-7.

GMELIN, J. F. 1791. *Caroli a Linné, Systema Naturae per Regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis. Editio decima tertia, aucta, reformata*. G Beer, Leipzig. 1 (6): 3021-3910.

KENSLEY, B. 1973. *Sea Shells of Southern Africa - Gastropods*. Maskew Miller, Cape Town. pp. 225.

SCHRÖTER, J. S. 1783. *Einleitung in die Conchylienkenntnis nach Linné*. J.J. Gebaner, Halle. 1ter Band, 860 pp.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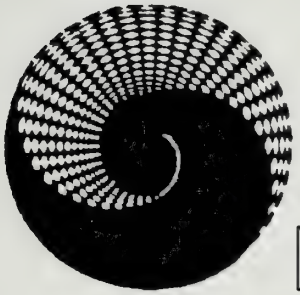

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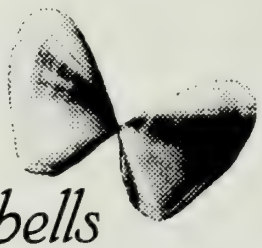

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LES MURICIDAE D'AFRIQUE OCCIDENTALE

THE WEST AFRICAN MURICIDAE

Roland HOUART

Les Muricidae d'Afrique occidentale
The West African Muricidae

I. Muricinae & Muricopsinae

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MOTS-CLEFS: Mollusca, Gastropoda, Muricidae, Afrique Occidentale, Révision.
KEYWORDS: Mollusca, Gastropoda, Muricidae, West Africa, Revision.

RESUME. Soixante-six espèces de Muricidae appartenant à la faune d'Afrique Occidentale sont revues, la plupart des types ont été examinés et sont illustrés. Quarante-cinq espèces sont endémiques à l'Afrique Occidentale, neuf espèces sont présentes également en Méditerranée, huit espèces sont amphiatlantiques, une espèce vit principalement dans le Nord-Est de l'Atlantique, trois espèces sont endémiques à l'Ile de Sainte-Hélène.

ABSTRACT. Sixty-six species of Muricidae from West Africa are revised, with most of the types examined and illustrated. Forty-five species are endemic to West Africa, nine species also live in the Mediterranean, eight species are amphiatlantic, one species occurs mainly in the northeastern Atlantic, three species are endemic to the Island of Saint Helena.

AVANT-PROPOS

Le volume important de cet article a nécessité sa parution en deux parties. La première partie contient l'introduction, les remerciements et l'analyse systématique des sous-familles Muricinae et Muricopsinae. La deuxième partie reprendra les autres sous-familles ainsi que les espèces de l'Ile de Sainte Hélène et la bibliographie.

Un important résumé en anglais suit le texte français dans les deux parties.

FOREWORD

The length of this paper has led to its being split into two parts. The first part includes the introduction, the acknowledgements and the systematic account for Muricinae and Muricopsinae. The second part will contain the other subfamilies, the species from the Island of Saint Helena and the bibliography.

An English abstract follows the French text in both parts.

INTRODUCTION

Il existe trois livres traitant de la faune malacologique de la côte Ouest africaine: "Mollusques testacés marins de la côte occidentale d'Afrique" par M. NICKLES (1950), "Coquillages du Gabon", par P.A. BERNARD (1984) et "Coquillages et mollusques d'Angola", par S. GOFAS, J. PINTO AFONSO et M. BRANDAO (1985). Outre dans ces trois livres, les mollusques d'Afrique Occidentale, et les Muricidae en particulier, ont été illustrés dans quelques ouvrages généraux et dans des articles spécialisés, qui sont cités dans la bibliographie.

En Afrique Occidentale, délimitée ici depuis le nord du Sahara Occidental, jusqu'au Sud de l'Angola, avec une petite incursion au Nord de la Namibie pour certaines espèces, les Muricidae récents sont représentés par 66 espèces ou sous-espèces: actuellement seize Muricinae, quinze Ocenebrinae, dix-sept Muricopsinae, trois Ergalataxinae, un Tripterotyphinae, trois Typhinae, trois Trophoninae et huit Rapaninae (ex Thaidinae). Certaines de ces espèces sont

endémiques à l'Ile de Sainte Hélène, ou font également partie de la faune malacologique de l'Atlantique Occidental (côte du Brésil) et de la Méditerranée, mais la plupart sont endémiques à la côte d'Afrique Occidentale.

La variabilité des coquilles de Muricidae est telle qu'elle a donné naissance à de nombreux noms qui désignent uniquement des variations de formes ou de couleurs d'une même espèce. Il en est de même en Afrique Occidentale, comme le prouvent d'ailleurs les nombreux synonymes.

De très nombreux exemplaires ont été examinés afin de compléter cette révision; ils proviennent pour la plupart des collections du Muséum National d'Histoire Naturelle à Paris, de l'Institut Royal des Sciences Naturelles de Belgique, de la collection personnelle de l'auteur et de quelques collections privées. Le matériel type a été examiné dans la plupart des cas.

***

There are three books on the malacological fauna of West Africa: "Mollusques testacés marins de la côte occidentale d'Afrique", by M. NICKLES (1950), "Coquillages du Gabon", by P.A. BERNARD (1984) and "Coquillages et mollusques d'Angola", by S. GOFAS, J. PINTO AFONSO and M. BRANDAO (1985). The West African molluscan fauna, including the Muricidae, has also been illustrated and discussed in some general works and in other, more specialized papers, all of them being cited in the bibliography.

The Muricidae in West Africa, here restricted to the area from the north of Western Sahara to the south of Angola, with some incursions into the north of Namibia, are represented by 66 Recent species or subspecies: sixteen of which are referred to the subfamily Muricinae, fifteen to Ocenebrinae, seventeen to Muricopsinae, three to Ergalataxinae, one to Tripterotyphinae, three to Typhinae, three to Trophoninae, and eight to Rapaninae (ex Thaidinae). Some of these taxa are endemic to the Island of St. Helena, or are also known in the Western Atlantic (Brasilian coast) and in the Mediterranean Sea, but most are endemic to the West African coast.

Variability of shells within the Muricidae has given rise to many names that designate different morphs or colour variations. This has happened also for the West African fauna, as can be seen in the list of synonyms.

Extensive material has been examined in order to complete this revision; most of it is stored in the Muséum National d'Histoire Naturelle, Paris, in the Institut Royal des Sciences Naturelles de Belgique, in the author's collection, and in some private collections. The type material has been examined for most of the species.

ABREVIATIONS - ABBREVIATIONS

AMNH: American Museum of Natural History, New York, U.S.A.; **BMNH**: The Natural History Museum, London; **IRSNB**: Institut Royal des Sciences Naturelles de Belgique, Brussels; **MCZ**: Museum of Comparative Zoology, Harvard University, Cambridge, USA; **MHNG**: Muséum d'Histoire Naturelle, Genève, Suisse; **MNHN**: Muséum National d'Histoire Naturelle, Paris; **NMW**: National Museum of Wales, Cardiff, U.K.; **RH**: collection de l'auteur (collection of the author); **SDSNH**: San Diego Natural History Museum, California, U.S.A.; **ZMB**: Museum für Naturkunde der Humboldt Universität zu Berlin, zoologisches Museum; **ZMC**: Zoologisk Museum, Copenhague, Danemark

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***

An omission, though unfortunate, is always possible. I hope this is not the case here, but if so, please accept my apology.

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SYSTEMATIQUE
SYSTEMATIC ACCOUNT

I. MURICINAE
Rafinesque, 1915

Les Muricinae sont représentés en Afrique Occidentale par quinze espèces et une sous-espèce, dont deux espèces méditerranéennes. Leur distribution est assez restreinte, du moins pour sept espèces, celles-ci possédant d'ailleurs une protoconque paucispirale, attestant d'une vie larvaire assez brève. Cinq espèces ont une distribution géographique très étendue, trois de celles-ci possèdent une protoconque multispirale, ces espèces connaissant donc probablement une vie larvaire planctonique plus ou moins longue. Deux espèces possèdant une protoconque paucispirale, *Bolinus cornutus* (Linnaeus, 1758) et *Purpurellus gambiensis* (Reeve, 1845) vivent depuis le Sénégal jusqu'en Angola.

L'habitat des Muricinae se situe généralement entre 0 et 100 mètres, sauf pour *Pterynotus leucas* Fischer, 1897), récolté à 640 m.

Deux espèces méditerranéennes se retrouvent l'une, *Hexaplex trunculus* (Linnaeus, 1758), aux Iles Canaries et au Nord de la Mauritanie et l'autre, *Dermomurex scalaroides* (de Blainville, 1829), jusqu'au Sénégal.

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Fifteen species and one subspecies of Muricinae live off West Africa. They live usually in 0 to 100 m. depth; *Pterynotus leucas* (Fischer, 1897) is found down to 640 m.

The geographical distribution of these species is restricted, at least for seven of them, all with paucispiral protoconch, attesting a short larval life. Five species have a more extended geographical distribution, usually from Mauritania or Senegal to Angola; three of them have a multispiral protoconch, probably attesting a planktotrophic larval development. Two species with a paucispiral protoconch range from Senegal to Angola.

Two Mediterranean species are also present: *Hexaplex trunculus* (Linnaeus, 1758) in the Canary Islands and north of Mauritania, and *Dermomurex scalaroides* (de Blainville, 1829), south to Senegal.

Genre *Bolinus*
Push, 1837

Espèce-type: *Murex brandaris* Linnaeus, 1758, par désignation originale.

Le genre *Bolinus* est représenté en Méditerranée par l'espèce-type, *Murex brandaris*, dont la distribution atlantique est strictement limitée à la péninsule ibérique. Du côté africain, *B. brandaris* ne dépasse pas Tanger vers l'Atlantique (PASTEUR-HUMBERT, 1962: 76, et S. GOFAS, comm. pers.).

Utilisé comme sous-genre de *Murex* par de nombreux auteurs, *Bolinus* est en fait distinct et caractérisé par la présence de cinq à sept varices sur le dernier tour, au lieu de trois pour le genre *Murex*, et par l'absence de dent labrale. Comme suggéré par PONDER & VOKES (1988: 14), *Bolinus* est probablement apparenté au genre *Hexaplex* Perry, 1811, la ressemblance avec les espèces du genre *Murex* due au long canal siphonal, étant seulement superficielle.

***

Considered a subgenus of *Murex* Linnaeus, 1758, by many authors, *Bolinus* differs in having five to seven axial varices instead of three in the genus *Murex*. As suggested in PONDER & VOKES (1988: 14), this genus appears to be closely related to *Hexaplex*, its similarity with *Murex* being only superficial due to the long siphonal canal.

Bolinus cornutus (Linnaeus, 1758)
Figs 1-4, 21, 41, 46

Murex cornutus Linnaeus, 1758: 746

Aranea conspicua Perry, 1811: pl. 54
Murex tumulosus Sowerby, 1841: 144

Matériel type: non localisé.

Localités types: *M. cornutus*: "O. Africano" (LINNAEUS, 1767: 1214); *A. conspicua*: "probably eastern Ocean"; *M. tumulosus*: inconnue.

Distribution: des Iles Canaries à l'Angola, infralittoral jusqu'à 30 m environ, sur fonds

meubles. La limite nord de répartition sur le continent n'est pas connue avec précision.

Remarques: *Bolinus cornutus* se distingue de *B. brandaris* par sa taille plus importante, sa spire moins haute et par la présence de deux rangées d'épines sur le canal siphonal (au lieu d'une seule chez *B. brandaris*). Le dernier tour porte généralement deux rangées d'épines, exceptionnellement trois; ces épines sont le plus souvent fortement recourbées vers l'arrière. Les individus à épines droites sont nommées *B. tumulosus* (Sowerby), mais ces spécimens ne constituent qu'une variation infrasubspécifique.

La coquille est brun pâle avec trois bandes spirales plus foncées, la couleur de l'ouverture varie de blanc à orangé. La taille adulte atteint 110 à 200 mm.

La protoconque de *B. cornutus* est paucispirale (Fig. 21) et indique un développement lécithotrophe ou encapsulé.

***

Bolinus cornutus is larger than the Mediterranean *B. brandaris*. The shell has a lower spire and has two rows of spines on the siphonal canal, whereas *B. brandaris* has only one row. *B. tumulosus* (Sowerby) is a form of *B. cornutus* having a shell with straight spines, instead of adaperturally recurved ones.

The shell is pale to dark brown, usually with 3 darker spiral bands. The aperture is white or light orange. The size varies from 110 to 200 mm in length.

Genre *Hexaplex*

Perry, 1811

Espèce-type: *Murex cichoreum* Gmelin, 1791, par désignation subséquente de Jousseaume (1880).

Les *Hexaplex* représentent un des traits caractéristiques du peuplement des Muricidae de la côte ouest-africaine. Sept espèces et une sous-espèce sont présentes. Les *Hexaplex* ouest-africains occupent tout le plateau continental, aussi bien sur substrats durs que sur fonds meubles, mais l'écologie de chaque espèce est mal connue. *H. rosarium* (Röding, 1798) a été observé se nourrissant de bivalves, qu'il ne perce pas; le bivalve est maintenu par le pied du Muricidae, qui atteint sa proie par l'ouverture des valves. En Angola, *H. rosarium* est capturé en abondance dans les filets de pêche (S. Gofas, comm. pers.).

***

The genus *Hexaplex* is represented by seven species and one subspecies in West Africa. They are known from Senegal to Angola and are morphologically extremely variable, so that there are numerous synonyms. The species may live on hard substrata or soft bottom but their ecology is still poorly known. In Angola, *H. rosarium* is very common in shell nets (S. Gofas, in litt.).

Hexaplex angularis (Lamarck, 1822)

Figs 31, 71-72, 74-77

Murex angularis Lamarck, 1822: 174

Murex sexcostatus Lamarck, 1816: pl. 441, fig. 3 (cf. remarques)
Murex octonus Sowerby, 1834: pl. 62, fig. 32
Murex pudicus Reeve, 1845: pl. 29, fig. 137
Murex inornatus A. Adams, 1853: 269 (not *M. inornatus* Récluz, 1851)
Murex lyratus A. Adams, 1853: 269 (not *M. lyratus* Gmelin, 1791 nec Lamarck, 1816)
Murex densus H. & A. Adams, 1853: 75 (n.n. pro *M. inornatus* A. Adams, 1853, not Recluz, 1851)
Murex adamsi Sowerby, 1879: 38, fig. 234 (n.n. pro *M. inornatus* A. Adams, 1853)
Murex tenuis Sowerby, 1879: 38, fig. 174
Murex hirsutus Poirier, 1883: 83, pl. 6, fig. 2
Murex goniophorus Euthyme, 1889: 259, pl. 7, fig. 4, 5

Matériel type examiné: *M. angularis*, 2 syntypes MHNG 1099/62/1-2; *M. pudicus*, holotype BMNH 197498; *M. inornatus*, 2 syntypes BMNH; *M. hirsutus*, 3 syntypes MNHN; autres types: non localisés.

Localités types: *M. octonus* et *M. goniophorus*, Sénégal; *M. pudicus*, "island of St Domingo" (erroné); *M. tenuis*, West Africa; les autres taxa ont été décrits sans indication d'origine.

Distribution: de la Mauritanie à l'archipel des Bissagos (Guinée Bissau), de 10 à 40 m, sur fonds rocheux.

Remarques: La première description et la première figure de cette espèce sont celles d'ADANSON (1757: 131, pl. 9, fig. 22), connue comme "Le Cofar"; sous ce nom Adanson avait apparemment confondu deux espèces: 7 spécimens de *Hexaplex angularis*, mesurant 20 à 42 mm et correspondant à la figure d'Adanson, ont été retrouvés dans sa collection et figurés par FISCHER-PIETTE (1942: 224, pl. 7, fig. 4). Les grands exemplaires d'Adanson atteignant "8 pouces" (soit 216 mm) n'ont pas été retrouvés mais, compte tenu de la taille, correspondaient très vraisemblablement à *Hexaplex duplex* (Röding, 1798). Contrairement à ce qui a été indiqué par divers auteurs, Lamarck n'a fait référence qu'avec doute à la figure d'Adanson lorsqu'il a décrit *Murex angularis*, puisqu'il écrit "An Cofar? Andans. Seneg., pl. 9 f. 22".

Murex sexcostatus Lamarck, 1816, prioritaire, devrait pourtant être considéré comme *nomen dubium*, l'illustration originale de Lamarck laissant subsister quelques doutes quant à son identification réelle, la localité type étant inconnue, et enfin, le matériel type étant introuvable.

L'importante liste synonymique atteste de la grande variabilité de cette espèce: les varices sont en nombre variable (de 4 à 10); la couleur, généralement noire, avec une ouverture blanche, peut aussi être rouge-orange, voire blanchâtre; de courtes épines sont généralement présentes, mais on rencontre aussi des coquilles inermes. Toutefois, d'autres caractères stables permettent l'identification de l'espèce: la protoconque, indiquant un développement larvaire non planctotrophe et dont une fraction du dernier tour est orné de fortes côtes axiales; la forme arrondie du dernier tour de spire; le bord columellaire adhérent à la coquille; le canal anal bien marqué mais peu profond; l'ouverture arrondie et le canal siphonal court, orné de 2 côtes spirales.

***

Hexaplex angularis is a variable species, as can be seen by the extensive list of synonyms. There are spinose, or almost smooth variations, with 4 to 10 axial varices; the shell is usually black with a white aperture, but orange or even white specimens are not uncommon. Nevertheless, the species is easily recognizable by the strong axial sculpture of the last whorl of the protoconch; the last teleoconch whorl is rounded; the rim of the columellar lip is adherent to the shell; the anal notch is clearly defined, and shallow; the aperture is rounded, and the siphonal canal is short with 2 spiral cords.

Murex sexcostatus Lamarck, 1816 is a possible subjective, senior synonym, but the original illustration of Lamarck, although resembling *H. angularis*, leaves some doubt about its real identity; the type locality is unknown, and the type material is not traceable. Therefore, I suggest *M. sexcostatus* be considered a *nomen dubium*.

Hexaplex bifasciatus (A. Adams, 1853)
Figs 5-6, 42

Murex bifasciatus A. Adams, 1853: 269

Matériel type: non localisé.

Localité type: Sénégal (ex Cuming coll.).

Distribution: Endémique à l'archipel du Cap Vert.

Remarques: *Hexaplex bifasciatus* a été régulièrement confondu avec *H. rosarium* (Röding, 1798), Mais BURNAY & VON COSEL (1983) ont parfaitement démontré la validité de cette espèce. La coquille d'*Hexaplex bifasciatus* est proportionnellement plus large, avec une spire moins haute. Ses varices sont peu épineuses, avec une seule épine carinale très courte, et les autres réduites à l'état de nodosités. Chez *H. rosarium*, les varices portent généralement des épines bien apparentes et les épines carinales sont longues. *H. bifasciatus* est de couleur blanchâtre avec trois larges bandes spirales brunes, bien distinctes au niveau de l'ouverture; sur la spire la bande abapicale est couverte par le tour suivant et seules les deux bandes adapicales sont visibles; le bord columellaire est rose à blanc-rose. *H. rosarium* est de couleur unie, blanc à brun clair, sans bande spirale vraiment apparente, ni sur la spire, ni au niveau de l'ouverture; les varices sont toutefois tachetées de brun; la columelle est rouge, exceptionnellement blanche; l'intérieur de l'ouverture est blanc.

A ces caractères conchyliologiques, BURNAY & VON COSEL (1983) ajoutent des différences basées sur la radula. La variabilité intraspécifique de la radula des Muricidae ne permet toutefois pas de retenir ce caractère pour

séparer *H. bifasciatus* de *H. rosarium* (BANDEL, 1984, FUJIOKA, 1985 et observations personnelles).

Les deux espèces sont sympatriques aux îles du Cap Vert, ce qui exclut que *Hexaplex bifasciatus* soit une simple sous-espèce géographique de *H. rosarium*. La protoconque de *H. bifasciatus* est inconnue, mais sa répartition géographique, limitée à l'archipel du Cap Vert, permet de supposer l'absence de larves planctoniques, alors que la protoconque multispirale de *H. rosarium* indique un développement larvaire planctotrophe.

Hexaplex bifasciatus atteint 55 à 83 mm à l'état adulte.

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Hexaplex bifasciatus has been regularly confused with *H. rosarium* (Röding, 1798) until BURNAY & VON COSEL (1983) published a study on the validity of the species. The shell of *H. bifasciatus* is relatively broader, with a lower spire; the varices are nodose, with a single, short carinal spine. *H. bifasciatus* is whitish with three broad brown spiral bands, very distinct in the aperture, the columellar lip is light pink. *H. rosarium* is uniformly coloured, white to pale brown, without apparent spiral bands on the spire whorls and into the aperture, the varices are occasionally stained with some darker blotches, the columellar lip is deep pink to red, very exceptionally white, the aperture is white within.

Both species are sympatric in the Cape Verde Archipelago, and this excludes the possibility that *H. bifasciatus* is a geographical subspecies of *H. rosarium*.

Hexaplex duplex (Röding, 1798)
Figs 7-10, 22, 43-45, 50-51, 55-56

Purpura duplex Röding, 1798: 141, ref. to Martini, 1777: figs 1013-1014

Murex turbinatus Lamarck, 1822: 179
Murex eurystomus Swainson, 1833: pl. 100
Murex hoplites Fischer, 1876: 236, pl. 8, fig. 3
Truncularíopsis trunculus canariensis Nordsieck, 1975: 5, fig. 20

Matériel type examiné: *M. turbinatus*, holotype MHNG 1099/46; *M. hoplites*, holotype MNHN.

Localités types: *P. duplex*, Guinée (MARTINI, 1777); *M. hoplites*, Afrique Occidentale; *T. trunculus canariensis*, Puerto de la Cruz, Iles Canaries; *M. turbinatus* et *M. eurystomus*, inconnue.

Distribution: des Iles Canaries à la Gambie.

Remarques: Pour les caractères distinctifs de *H. duplex* et de *H. rosarium*, voir sous ce nom.

Murex saxatilis Linnaeus, 1758 est un nom parfois utilisé dans la littérature ouest-africaine pour désigner cette espèce. Il n'existe plus de matériel type, et à l'instar de DODGE (1957: 91) et de RADWIN & D'ATTILIO (1976: 89), je considére ce nom linnéen comme un *nomen dubium*.

La coquille de jeunes *H. duplex* ressemble à certaines formes adultes de *H. trunculus* (Linnaeus, 1758) (Fig. 43). On reconnaît *H. trunculus* à sa sculpture axiale, comprenant 5 à 6 varices (avec côte intervaricale) par tour, alors que les jeunes *H. duplex* ont 9 à 11 varices par tour, généralement sans côte axiale intervaricale. La callosité columellaire est bien délimitée chez *H. trunculus*, et quelquefois bordée d'une fine ligne orange ou jaune, tandis que la callosité est mal délimitée et appliquée contre le bord columellaire chez *H. duplex*, où elle n'est jamais bordée d'une ligne orange.

H. duplex adulte atteint 120 à 200 mm. La coquille est brunâtre avec trois faibles bandes spirales, apparaissant brunes sur la spire et rouges dans l'ouverture; le bord columellaire est plus vif, rose orange à rouge vif. On rencontre parfois des exemplaires uniformément rose-orange ou blanc.

La protoconque (Fig. 22) est paucispirale et indique un développement non planctotrophe. il est probable que la ponte contenant des embryons se développant par adelphophagie, et attribuée par KNUDSEN (1950: 102) à *Murex senegalensis* appartienne en fait à *H. duplex*, puisque c'est l'unique *Hexaplex* du Golfe de Guinée sans larves planctoniques.

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For differences between *H. duplex* and *H. rosarium* (Röding, 1798), see that name.

The name *Murex saxatilis* Linnaeus, 1758, occasionally used to designate this large West African species is a *nomen dubium* (see DODGE, 1957: 91 and RADWIN & D'ATTILIO, 1976: 89). The type of *M. saxatilis* was not located.

Some specimens of *H. trunculus* (Linnaeus, 1758) are very similar to young forms of *H. duplex* (Fig. 43), but they can be recognized by the 5 or 6 varices in *H. trunculus*, (with an intervarical axial ridge) instead of 9 to 11 in *H. duplex* (without intervarical axial ridges). The columellar lip rim is clearly delimited in *H. trunculus* and sometimes bordered by a narrow, fine orange line, while the columellar lip is adherent to the shell in *H. duplex*, and never bordered with an orange line.

Adult specimens of *H. duplex* reach 120 to 200 mm in length, the shell is brownish with 3 narrow spiral bands, brown on the spire and red into the aperture, the columellar lip is pinkish-orange to bright red, the shell is occasionally uniformly pinkish-orange or white.

The protoconch is paucispiral (Fig. 22) and indicates non-planktotrophic larval development.

Hexaplex megacerus (Sowerby, 1834)
Figs 12, 27-28, 47-48, 54

Murex megacerus Sowerby, 1834: 145; 1841: pl. 60, fig. 18

Murex moquinianus Duval, 1853: 203, pl. 5, fig. 4

Matériel type examiné: *M. megacerus* 3 syntypes BMNH 197474; *M. moquinianus*: non localisé.

Localités types: *M. megacerus*, "at Mare Pacificum"; *M. moquinianus*, "les mers de Chine" (les deux localités sont erronées).

Distribution: *H. megacerus* vit depuis le Sénégal (région de Dakar) jusqu'en Angola (région de Luanda), du littoral jusqu'à 40 m environ.

Remarques: A la suite d'une confusion remontant à TRYON (1880), les noms *Murex bourgeoisi* Tournouër, 1875 et *Murex quadrifrons* Lamarck, 1822 ont été, à tort, utilisés pour cette espèce. Cette confusion, reprise par NICKLES (1950: 91) et par KNUDSEN (1956: 13), a été éclaircie par BURNAY (1985), qui donne une liste de citations et rappelle que *M. quadrifrons* est une espèce du Pacifique, synonyme de *Murex capucinus* Lamarck, 1822 (voir également HOUART, 1992: 106), et que *M. bourgeoisi* est une espèce du Miocène français, qui possède quelques affinités mais n'est pas identique aux *Hexaplex* actuels ouest-africains.

La coquille de *H. megacerus* est brunâtre avec des épines légèrement plus sombres et une ouverture blanche. Les épines généralement courtes et quelque peu foliacées, peuvent parfois atteindre un développement plus important (Fig. 48). La taille de l'adulte varie entre 70 et 132 mm.

Aucune protoconque intacte n'a pu être observée. L'apex, partiellement conservé chez quelques spécimens, montre 2 à 2,5 tours avec une fine carène spirale; la protoconque complète est certainement multispirale, et le développement très probablement planctotrophe. La description de la ponte, description donnée par KNUDSEN (1950: 99, fig. 10) comme étant celle de *Murex quadrifrons*, mais correspondant à une espèce à développement avec adelphophagie et métamorphose intracapsulaire est donc très douteuse.

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Due to a confusion which first appeared in TRYON (1880), the names *Murex bourgeoisi* Tournouër, 1875 and *Murex quadrifrons* Lamarck, 1822 have been erroneously used for this species. This confusion was repeated in NICKLES (1950: 91) and in KNUDSEN (1956: 13). BURNAY (1985) gave a list of citations and reminded the reader that *M. quadrifrons* is a species occurring in the Pacific Ocean, and a synonym of *Murex capucinus* Lamarck, 1822 (see also HOUART, 1992: 106), and that *M. bourgeoisi* is a fossil species of the French Miocene, closely related, but different from the Recent West African species of *Hexaplex*.

The shell of *H. megacerus* is brown with somewhat darker spines and a white aperture. The spines are usually short and frondose, but they may be much longer in some specimens (Fig. 48). Adult shell reaches a length of 70 to 132 mm.

The intact protoconch has not been observed, but the partially broken apex shows 2 to 2.5 whorls with a narrow spiral keel. A complete protoconch is certainly multispiral and the development is probably planktotrophic.

Hexaplex rosarium (Röding, 1798)
Figs 13-16, 23, 52-53, 57-60

Purpura rosarium Röding, 1798: 140

Purpura imperialis Schumacher, 1817: 213
Murex melonulus Lamarck, 1822: 171
Murex ananus Hinds, 1843: 127
Murex beckii Philippi, 1847: pl. 2, fig. 1 (not *M. becki* Michelotti, 1847)
Murex sowerbianus Poirier, 1883: 78

Materiel type examiné: *Purpura rosarium* et *P. imperialis* sont deux noms basés sur les mêmes figures de CHEMNITZ (1788: figs 1528-1529), dont un syntype au Zoologisk Museum à Copenhague a été figuré par CERNOHORSKY (1974: fig. 47), comme syntype de *H. rosarium*; *M. melonulus* est fondé sur la même figure de Chemnitz et un nombre non précisé d'exemplaires, dont deux sont au Muséum de Genève (MHNG 1099/51-52), leur statut de spécimens-types est toutefois incertain; *M. ananus*, non localisé au BMNH; *M. sowerbianus*, 7 syntypes MNHN, l'un d'eux choisi ici comme lectotype (voir remarques et Fig. 53).

Localités types: *M. ananus*, West coast of Africa; *M. sowerbianus*, "Sénégal et Gorée"; *M. beckii* et *M. melonulus*, inconnue.

Distribution: de l'archipel du Cap Vert à l'Angola, du littoral jusqu'à une profondeur de 60 m.

Remarques:

1. Remarques de nomenclature.

La synonymie de *Purpura imperialis* et de *Murex ananus* avec *Hexaplex rosarium* ne nécessite pas de commentaires particuliers (cf. dans "Matériel type examiné"). Aucun des deux spécimens de *M. melonulus* conservés à Genève n'est la coquille figurée sous ce nom par KIENER (1842: pl. 45, fig. 1), mais ces spécimens et la figure de KIENER représentent la forme de *H. rosarium* à épines émoussées vivant à Sao Tomé (Fig. 59).

Le nom *M. sowerbianus* a été introduit par Poirier sur la base de 9 syntypes, et sur les figures de *Murex turbinatus* (not Lamarck, 1816) publiées par REEVE (1845: pl. 3, fig. 15) et SOWERBY (1879: fig. 185). Les exemplaires figurés par REEVE et par SOWERBY semblent effectivement être des *H. rosarium* et non des *H. duplex*, dont le nom *M. turbinatus* est synonyme (cf. sous *H. duplex*); des 9 syntypes de *M. sowerbianus* conservés au MNHN, 7 sont des *H. rosarium* et 2 des juvéniles de *H. duplex*; l'un des 7 *rosarium* est ici désigné comme lectotype de *M. sowerbianus* (Fig. 53).

Enfin, il est nécessaire de discuter ici du nom *Murex pomiformis* Locard, 1897. Les indications données par Locard conduisent à considérer *M. pomiformis* comme une émendation injustifiée de *Murex pomum* Gmelin, 1791, qui est un *Phyllonotus* de l'Atlantique occidental. LOCARD (1897: 308) utilise le nom *pomiformis* pour un exemplaire de St Vincent, îles du Cap Vert, 70 m (expédition du "Talisman", 1883, dragage 107), conservé au MNHN; il s'agit sans aucun doute d'un jeune *H. rosarium*. Toutefois, le nom *Murex pomiformis* a une valeur nomenclaturale, et doit être considéré comme un synonyme objectif de *Murex pomum* (ICZN § 33b iii).

2. Remarques sur la variabilité.

Hexaplex rosarium forme des populations peu variables morphologiquement, mais cependant parfois reconnaissables macrogéographiquement. L'espèce est surtout commune du Gabon à l'Angola. A Sao Tomé, dans les autres îles du Golfe de Guinée et au Gabon, *H. rosarium* présente une spire assez haute, des varices axiales à épines émoussées, et une sculpture intervaricale noduleuse (Fig. 59). Certaines formes possèdent néanmoins de courtes épines carinales, se rapprochant ainsi de la forme "typique"; on n'observe pas de différences entre les individus pêchés à 2 m et les individus dragués vers 40-50 m.

S. Gofas (comm. pers.) résume ainsi la variabilité observée dans la région d'Angola. Dans le nord de l'Angola (région de Cacuaco), l'espèce vit sur fond vaseux par 5-10 m; sa spire est basse, la coquille est épaisse, avec des varices et des épines massives, et elle atteint une taille adulte moyenne de 108 mm (cette forme est celle que l'on rencontre également plus à l'Ouest dans le Golfe de Guinée).

Dans la région de Luanda, deux formes bathymétriquement séparées se rencontrent: sur les petits fonds (5-15 m) de sables et graviers, vivent de grands individus (taille adulte moyenne 101 mm), à coquille à spire basse, morphologiquement très proches de ceux du Cacuaco, n'en différant essentiellement que par

une disposition plus serrée des varices axiales; plus profondément, sur les fonds durs de 40-60 m, vivent des individus à spire plus haute et à sculpture très épineuse, atteignant une taille adulte moyenne de 81 mm. Cette dernière forme se rencontre sur les mêmes types de fonds jusque dans la région de Benguela; dans les localités intermédiaires (Cabo Ledo), la forme générale est la même et la taille adulte moyenne est intermédiaire.

Cette variabilité peut être interprétée de deux façons:

a) ou bien il existe en Angola deux espèces distinctes, l'une à coquille massive vivant sur les fonds sablo-vaseux par 5-15 m, l'autre à coquille plus haute, plus épineuse, vivant sur fonds rocheux par 40-60 m, les deux espèces étant parapatriques dans la région de Luanda.

b) Il n'existe qu'une seule espèce et toute la variabilité observée est écophénotypique.

A l'appui de la première hypothèse, on peut mentionner d'une part l'absence de variation liée à la bathymétrie à Sao Tomé, d'autre part l'absence apparente de formes intermédiaires dans la région de Luanda. A l'appui de la seconde hypothèse, il faut toutefois remarquer une similarité morphologique évidente des coquilles, qui, indépendamment de leur caractère plus ou moins massif, ou du fait que la longueur et la forme des épines soient différentes, sont pratiquement identiques au point de vue forme générale, nombre d'épines, sculpture spirale et couleur; notons également la totale identité morphologique des protoconques multispirales et des pénis (S. Gofas, in litt.) de toutes ces formes.

Je me limiterai pour le moment à admettre l'existence d'une seule et même espèce montrant une remarquable variabilité.

3. Comparaison avec *H. duplex* (Röding, 1798).

Hexaplex rosarium et *H. duplex* ont souvent été confondus (voir par exemple RADWIN et D'ATTILIO, 1976: 88). Les juvéniles des deux espèces sont immédiatement séparables par la morphologie de la protoconque, multispirale à petit nucleus initial chez *H. rosarium*, paucispirale à gros nucleus initial chez *H. duplex*, indiquant respectivement un développement planctotrophe et non planctotrophe. Les différences entre les téléoconques des deux espèces sont résumées dans le tableau suivant:

	H. rosarium	*H. duplex*
Protoconque	multispirale, de 3,5 tours, carène suprasuturale sur les deux derniers tours; granules espacés sur le dernier tour.	paucispirale, de 2 à 2,7 tours, pas de carène suprasuturale; sculpture très dense de granules sur le dernier tour, surtout à l'approche de la varice terminale.
Premier tour	12-14 côtes axiales	12-14 côtes axiales
Deuxième tour	11-14 côtes axiales	11 côtes axiales
Troisième tour	6 varices larges et parfois une côte intervaricale	11-13 côtes axiales
Quatrième tour	6 varices et 1, parfois 2 côtes intervaricales	9-11 côtes axiales
Cinquième tour	6 varices, 1 côte intervaricale, apparition des épines carinales	9-10 varices larges, parfois 1 côte intervaricale
Sixième tour	6 varices avec épines carinales, un nodule intervarical faible	9-10 varices larges, quelquefois pourvues d'épines carinales; très rarement un nodule intervarical
Taille adulte	jusqu'à 155 mm pour 8 ou 9 tours de téléoconque	jusqu'à 200 mm pour 8 ou 9 tours de téléoconque.

Table 1: Différences entre *Hexaplex rosarium* et *H. duplex*.

Outre ces différences, *H. duplex* se distingue de *rosarium* par son canal siphonal plus large, sa spire moins haute et une callosité columellaire légèrement plus large. La couleur de fond de *H. rosarium* est brun pâle avec des taches brunes plus foncées entre et sur les varices, et sur les épines. La couleur de *H. duplex* est plus uniforme, généralement brunâtre, blanc sale ou blanc jaunâtre (quelquefois orangé), présentant parfois 3 faibles bandes brunâtres, visibles entre les varices, et non des taches brunes sur les varices comme chez *H. rosarium*.

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1. Discussion on the synonymy.

The taxa *Purpura imperialis*, *Murex ananus* and *M. rosarium* are based on the same figures 1528 and 1529 of CHEMNITZ (1788) and are objective synonyms. POIRIER (1883: 78) thought that *Murex turbinatus* (not Lamarck, 1822) illustrated in REEVE (1845: pl. 3, fig. 15) and in SOWERBY (1879: fig. 185) is another species, naming it *M. sowerbianus*. There are 9 syntypes of *M. sowerbianus* in the MNHN, 7 of the specimens are undoubtedly *H. rosarium* while 2 are juveniles of *H. duplex*. A lectotype is here designated (Fig. 53).

2. Remarks on the variability.

Local populations of *Hexaplex rosarium* are not variable morphologically, but some forms are typical in some localities, such as those in the Canary Islands, Sao Tome, and in other islands of the Gulf of Guinea and in Gabon, where shells of *H. rosarium* are almost spineless, with a high spire, and spines reduced to blunt knobs (Fig. 59). In these localities, specimens living in 2 m or in 40-50 m are similar. On the other hand, in Angola, differences are noted for specimens occuring at different depths. Nevertheless, there is clear morphological similarity in the shells, and even if some forms are more massive, or more nodose instead of spiny, the overall outline, the spiral sculpture, the number of spines, the colour, the protoconch are identical in all forms. I therefore conclude the existence of one, variable, species.

3. Comparison with *H. duplex* (Röding, 1798).

Hexaplex duplex differs from *H. rosarium* in its different axial sculpture, as seen in Table 1, in its broader siphonal canal, its higher spire, in the more uniformly coloured shell, and in the different protoconch: multispiral and conical, with 3.5 whorls in *H. rosarium*, paucispiral, rounded, with 2 - 2.7 whorls in *H. duplex*.

Hexaplex saharicus saharicus (Locard, 1897)
Figs 24-26, 49, 61-62

Murex saharicus Locard, 1897: 305, pl. 15, figs 17-20

Matériel type examiné: Lectotype, désigné ici, et deux paralectotypes MNHN.

Localité type: Cap Blanc (Nord de la Mauritanie), 120 m.

Distribution: Du Maroc atlantique (région de Larache) jusqu'en Guinée, sur fonds durs, entre 40 et 160 mètres.

Remarques: Les trois syntypes sur lesquels Locard a fondé l'espèce sont des individus juvéniles: le lectotype mesure 28,6 mm et le plus grand des paralectotypes atteint 29,5 mm pour 5 tours de téléoconque. Les plus grands individus récoltés récemment atteignent 84 mm, mais des exemplaires originaires de Larache (El Araich, Maroc) et mesurant une cinquantaine de millimètres (51,5 mm pour 6 tours de téléoconque) paraissent adultes: la lèvre externe est bien formée et épaisse. Ces spécimens de la région de Larache ont des épines nettement plus courtes.

Le spécimen à longues épines carinales, originaire du plateau marocain par 150-160 m, et figuré par FECHTER (1977) est un jeune de 30 mm.

La protoconque de *H. saharicus* (Figs 24-26) est paucispirale, formée de 2 tours, et indique un développement larvaire non planctotrophe.

Hexaplex megacerus est parfois confondu avec *H. saharicus*, mais les épines de *H. saharicus* sont plus largement ouvertes et lisses, tandis qu'elles sont plus foliacées et plus étroites chez *H. megacerus*; la protoconque de *H. megacerus* est multispirale.

La coquille de *H. saharicus* est brunâtre avec souvent une bande plus foncée sur la partie adapicale des tours. Le bord columellaire est blanc.

***

There are three syntypes of *H. saharicus* in the MNHN. A lectotype is here designated. Adult specimens of *H. saharicus* may reach a

length of 84 mm, but specimens of about 50 mm in length, with 6 teleoconch whorls, from El Araich (Marocco), seem to be adult: the outer apertural lip is thick and solid. Shells originating from this locality also bear much shorter varical spines.

Hexaplex saharicus differs from *H. megacerus* in its more broadly open and smoother spines, which are more frondose and narrower in *H. megacerus*. The protoconch of *H. megacerus* is multispiral and conical.

The shell of *H. saharicus* is brownish with often a darker coloured band on the adapical part of teleoconch whorls, and a white columellar lip.

Hexaplex saharicus ryalli Houart, 1993
Figs 11, 29-30, 63-66

Hexaplex saharicus ryalli Houart, 1993: 18, figs 1-4, 17, 20-21.

Matériel type examiné: Holotype MNHN.

Localité type: Abidjan, Côte d'Ivoire.

Distribution: Côte d'Ivoire et Ghana, 40-60 m.

Remarques: *Hexaplex saharicus ryalli* diffère de *H. saharicus saharicus* par sa protoconque, dont le dernier tour et une partie de l'avant-dernier tour sont fortement sculptés de côtes axiales (Figs 29-30), tandis que la varice terminale est pratiquement absente, en comparaison de la protoconque entièrement lisse et de la varice terminale bien apparente chez l'espèce nominale. D'autres différences sont à signaler: le canal siphonal est proportionellement plus long et plus étroit chez *H. saharicus ryalli*, la sculpture intervaricale est plus forte et on note aussi l'absence de courtes épines entre l'épine abapicale du dernier tour et l'épine adaperturale du canal siphonal.

Hexaplex saharicus saharicus est présent depuis le Maroc jusqu'au Sénégal. Aucun exemplaire de *H. saharicus saharicus* ou de *H. saharicus ryalli* n'a été trouvé dans la région située entre le Sénégal et la Côte d'Ivoire.

Hexaplex saharicus ryalli possède une coquille ocre ou brune avec une ouverture blanche, les spécimens adultes atteignant une taille de 45 mm.

***

Hexaplex saharicus ryalli differs from *H. saharicus saharicus* (Locard, 1897) in the protoconch and teleoconch morphology. The last whorl, and a portion of the penultimate protoconch whorl of *H. saharicus ryalli* bear strong axial ribs, and the transition protoconch/teleoconch is gradual, without apparent terminal varix in all specimens examined (Figs 29-30). In *H. saharicus saharicus*, the protoconch is entirely smooth with an apparent, raised terminal varix. The siphonal canal is proportionally longer and narrower in *H. saharicus ryalli*, the intervarical axial sculpture is stronger, and there are no short spines between the abapical apertural spine and the adapertural spine of the siphonal canal.

Hexaplex saharicus saharicus is known from Morocco (Tanger and off Larache) to Senegal. All examined specimens have a smooth protoconch. No records of *H. saharicus saharicus* or *H. saharicus ryalli* are known from the coast between Senegal and Ivory Coast.

The shell is ochre or brown, with an adult size of 45 mm in length.

Hexaplex varius (Sowerby, 1834)
Figs 32, 67-70

Murex varius Sowerby, 1834: fig. 57; 1841: 144

Murex clausii Dunker, 1879: 215, pl. 8, fig. 6
Murex varius var. *inops* Dautzenberg, 1891: 40
Murex senegalensis auct. (par exemple KNUDSEN, 1956: 17), not *M. senegalensis* Gmelin, 1791, une espèce du Brésil

Matériel type examiné: *M. varius*: 3 syntypes BMNH 197476; *M. inops*: non localisé.

Localité type: *M. varius*, Gambie; *M. clausii*, "littus guineense"; *M. varius* var. *inops*, diverses localités du Sénégal.

Distribution: Depuis le Sénégal jusqu'en Angola (région de Luanda), vers 15-35 m de fond. Fonds sableux ou rocheux.

Remarques: *Hexaplex varius* est facilement distinguable des autres *Hexaplex*. Le premier tour de la téléoconque porte 10 ou 11 côtes axiales, dont certaines se transforment en

varices dès le 2ème ou le 3ème tour; les tours suivants ont 3 varices et 3 nodules intervaricaux par tour, comme les *Chicoreus* typiques; enfin, sur le dernier tour ou dès l'avant-dernier tour, les nodules intervaricaux deviennent des varices et le dernier tour présente six varices comme les *Hexaplex* typiques. Il arrive parfois que les nodules intervaricaux restent présents sans transformation jusqu'au dernier tour: c'est cette forme qui porte le nom de *"Chicoreus" clausii*. Ceci démontre combien *Chicoreus* et *Hexaplex* sont des genres proches. *Chicoreus* ayant d'ailleurs probablement pour origine *Hexaplex* (VOKES, 1971). Il serait tout à fait approprié de traiter *Chicoreus* comme un sous-genre d'*Hexaplex* (comme l'a noté VOKES, 1973), ce qui est malheureusement techniquement impossible, *Chicoreus* étant le nom le plus ancien. Pour cette raison, notamment, *Hexaplex* sera maintenu au rang de genre.

Hexaplex varius n'est pas une espèce très variable. La forme *clausii*, outre la différence dans la disposition des varices citée plus haut, a souvent une coquille plus légère et un canal siphonal légèrement plus long; on trouve toutefois des individus de type *clausii* qui ne diffèrent des *varius* typiques que par la présence des 3 varices et 3 nodules intervaricaux sur le dernier tour. La protoconque conique, multispirale, formée de 4 tours, est identique dans les deux formes. La téléoconque est brun clair, avec l'extrémité du canal siphonal et la sculpture axiale et spirale plus foncées. Les plus grandes épines abapicales du dernier tour, ainsi que le cordon spiral rejoignant entre elles ces épines, sont plus clairs, parfois mêmes blancs. Cette coloration remarquable se rencontre aussi dans la forme *clausii* et est caractéristique de l'espèce. *C. varius* et la forme *clausii* sont sympatriques, notamment à Pointe Noire, Congo (Figs 67-68, 70)

La coquille de l'adulte atteint 33 à 72 mm. La taille de 110 mm pour la forme *clausii* est exceptionnelle (coll. P.H. Hattenberger).

La protoconque est multispirale (Fig. 32) et indique un développement larvaire planctotrophe. La ponte attribuée par KNUDSEN (1950: 102) à *Murex senegalensis* est certainement incorrectement identifiée, puisque contenant des larves se développant avec adelphophagie et métamorphose intracapsulaire.

***

Hexaplex varius is easily separable from the other species of *Hexaplex*. The first teleoconch whorl bears 10 or 11 axial ribs, some of which change into varices on the second or third whorl; the following whorls have 3 varices and 3 intervarical nodes, like in typical species of *Chicoreus*. The axial nodes change into varices on the last whorl, or eventually on the penultimate whorl, the last whorl showing 6 varices, as in typical shells of *Hexaplex*. Occasionally, these axial nodes do not change into varices and stay without any transformation, even on the last whorl: this form is known as *Chicoreus clausii* (Dunker, 1879). This also proves the close relationship existing between *Chicoreus* and *Hexaplex* (see VOKES, 1971 and 1973). The form *clausii* also has a lighter shell, and a slightly longer siphonal canal; however, these differences are not always constant, and some of the *clausii* forms only differ by the sculpture of the last whorl. The multispiral, conical protoconch, as well as the particular coloration is identical in both forms: the shell is light brown with darker siphonal canal and axial sculpture; the longest abapical spines of the last whorl, as well as the spiral cord connecting these spines are lighter coloured, or even occasionally white. *H. varius* and the form *clausii* are sympatric, for instance at Pointe Noire, Republic of Congo (Figs 67-68, 70).

The length of an adult shell varies from 33 to 72 mm; 110 mm for the form *clausii* is exceptional (coll. P.H. Hattenberger).

Genre *Pterynotus*

Swainson, 1833

Espèce-type: *Murex pinnatus* Swainson, 1822, par désignation originale.

Pterynotus leucas (Fischer, 1897)

Figs 33-34, 73

Murex leucas Fischer in Locard, 1897: 306, pl. 15, figs 10-13

Matériel type examiné: Le lectotype (sélectionné par BOUCHET & WAREN, 1985: 147) et 4 paralectotypes ont été égarés; un paralectotype (Fig. 73) reste accessible au MNHN.

Localité type: TALISMAN sta. 71, 25°39 N, 15°58 W, 640 m (Sud du Maroc, ex Sahara espagnol).

Distribution: du Sud du Maroc au Sénégal, 600 - 640 m.

Remarques: Le *Pterynotus* cité du Grand Banc Meteor (FECHTER, 1977) et des Açores (FAIR, 1976: pl. 13, fig. 169) sous le nom *P. leucas* est en réalité *P. atlantideus* Bouchet & Warén, 1985. *P. atlantideus* se distingue de *P. leucas* par la présence d'une nodule intervarical, par des lamelles axiales moins nombreuses sur les premiers tours de spire, et par une taille adulte plus faible (de 21 à 32 mm, contre 31 à 47 mm chez *P. leucas*).

La coquille de *P. leucas* est blanche tandis que celle de *P. atlantideus* est d'un brun très pâle avec des varices (ou la sculpture intervaricale) ornées de taches brunâtres éparses.

Il est également à noter que *P. leucas* n'est probablement pas un "vrai" *Pterynotus* (P. Lozouet, comm. pers.). En effet, *P. leucas* possède plusieurs lamelles axiales jusqu'au troisième ou quatrième tour de téléoconque, contrairement aux "vrais" *Pterynotus*, dont *P. atlantideus*, qui soit comportent 3 varices axiales dès le premier tour de téléoconque, ou bien possèdent des côtes axiales sur le premier ou les deux premiers tours, remplacées par 3 varices et une côte axiale intervaricale à partir du deuxième ou du troisième tour.

***

The specimen cited and illustrated in FECHTER (1977) and in FAIR (1976: pl. 13, fig. 169) as *P. leucas* was subsequently named *P. atlantideus* Bouchet & Warén, 1985. *P. atlantideus* differs from *P. leucas* in having an intervarical axial node, less numerous axial lamellae on the first teleoconch whorls and a smaller adult shell.

P. leucas is probably not a true *Pterynotus* (P. Lozouet, in litt.) because of the different axial sculpture of the first teleoconch whorls. Species like *P. atlantideus* or *P. pinnatus* (Swainson, 1833) (the type species) bear 3 axial varices from the first teleoconch whorl, or axial ribs on the first whorl, or on first and second whorls, changing into 3 varices and one intervarical axial node from the second or third whorl. *P. leucas* has many axial lamellae from first to third or fourth whorl.

P. leucas is white and adult shells reach a length of 47 mm.

The lectotype (selected by WAREN & BOUCHET: 147) and 4 paralectotypes were mislaid; one paralectotype (Fig. 73) is currently accessible in MNHN.

Genre *Purpurellus*

Jousseaume, 1880

Espèce-type: *Murex gambiensis* Reeve, 1845, par désignation originale.

Les trois espèces récentes de *Purpurellus* possèdent un canal siphonal soudé ventralement et un opercule à nucleus central. Ces caractères les excluent des *Pterynotus*, mais les rapprochent du genre *Pteropurpura* (Ocenebrinae). La radula, figurée par EMERSON & D'ATTILIO (1969) et par THIELE (1929), confirme toutefois son classement dans les Muricinae.

***

Three species of *Purpurellus* are known, all with a sealed siphonal canal and an operculum with central nucleus, characters that definitely exclude them from the genus *Pterynotus*. Species of the genus *Pteropurpura* (Ocenebrinae) are somewhat similar but the radula of *Purpurellus* (EMERSON & D'ATTILIO, 1969 and THIELE, 1929) is typically muricine.

Purpurellus gambiensis (Reeve, 1845)

Figs 35, 80-82

Murex gambiensis Reeve, 1845: pl. 16, fig. 65

Matériel type examiné: 4 syntypes BMNH 1966492 et 1967578.

Localité type: Mouth of the Gambia River, west coast of Africa.

Distribution: de la presqu'île du Cap Vert (Sénégal) à l'Angola, sur fonds durs comme sur fonds meubles, 30-100 m.

Remarques: *Murex osseus* Reeve, 1845 est souvent cité comme synonyme de *Purpurellus gambiensis*, probablement à la suite de TRYON (1880) qui fut le premier à réunir les deux noms;

en réalité, *M. osseus* est un synonyme de *P. pinniger* (Broderip, 1833), une espèce du Pacifique oriental (PAIN, 1976: 79). Deux syntypes de *P. gambiensis* ont été figurés par D'ATTILIO (1985).

La coquille est généralement brune, mais peut revêtir plusieurs tons, de jaune pâle à taché de brun, ou entièrement blanc. Les épines carinales, l'expansion foliacée du bord externe de l'ouverture et le canal siphonal sont brun clair à blanc.

La taille adulte varie de 45 à 80 mm.

***

Murex osseus Reeve, 1845, occasionally cited as a synonym of *Purpurellus gambiensis*, is actually a synonym of *P. pinniger* (Broderip, 1833), a species from the eastern Pacific (PAIN, 1976: 79). Two syntypes of *P. gambiensis* were figured by D'ATTILIO (1985).

The shell of *P. gambiensis* is usually brownish but yellow, white, pink, or mottled specimens are not uncommon. The carinal spines, the outer apertural lip expansion, and the siphonal canal are usually light brown to white. The size of adult shells varies from 45 to 80 mm in length.

Genre *Attiliosa*

Emerson, 1968

Espèce-type: *Coralliophila incompta* Berry, 1960 [= *Attiliosa nodulosa* (A. Adams, 1855)], par désignation originale.

Il existe huit espèces et une sous-espèce d'*Attiliosa*: *A. nodulosa* (A. Adams, 1855) du Pacifique oriental; *A. philippinana* (Dall, 1889) de Floride; *A. glenduffyi* Petuch, 1993 des Antilles; *A. aldridgei* (Nowell-Usticke, 1969) de différentes localités de l'Atlantique occidental; *A. goreensis* Houart, 1993 du Sénégal; *A. bozzettii* Houart, 1993 de Somalie; *A. nodulifera* (Sowerby, 1841) et sa sous-espèce *caledonica* (Jousseaume, 1881) de l'Indo-Pacifique et *A. orri* (Cernohorsky, 1976) des Iles Andamans et de Thailande. Leur classification dans les Muricinae est principalement basée sur la radula.

***

There are eight species and one subspecies of *Attiliosa* known to date: *A. nodulosa* (A. Adams, 1855) from the eastern Pacific, *A. philippiana* (Dall, 1889) from Florida, *A. glenduffyi* Petuch, 1993 from the Greater Antilles, *A. aldridgei* (Nowell-Usticke, 1969) from different localities in the western Atlantic, *A. goreensis* Houart, 1993 from Senegal, *A. bozzettii* Houart, 1993 from Somalia, *A. nodulifera* (Sowerby, 1841) and its subspecies *caledonica* Jousseaume, 1881 from the Indo-West Pacific, and *A. orri* (Cernohorsky, 1976) from the Andaman Islands and Thailand. Their classification in the Muricinae is primarily based on radular morphology.

Attiliosa goreensis Houart, 1993

Figs 19-20, 37-38, 83-85

Attiliosa goreensis Houart, 1993: 20, figs 11-13, 18-19, 26-27

Matériel type examiné: Holotype MNHN.

Localité type: Gorée, Sénégal, 20-25 m.

Distribution: Gorée, Sénégal, 18-25 m.

Remarques: *Attiliosa goreensis* est une petite espèce d'une taille moyenne de 13 à 15 mm, la couleur est très variable, de blanc à brun très foncé avec quelquefois une fine ligne brune encerclant toute la coquille.

***

Attiliosa goreensis is 13-15 mm in length, white, light brown, pale orange or dark brown, occasionally with a narrow darker line encircling the shell adapically of shoulder.

Genre *Dermomurex*

Monterosato, 1890

Sous-genre: *Trialatella* Berry, 1964

Espèce-type: *Trialatella cunninghamae* Berry, 1964, par désignation originale

Dermomurex (Trialatella) sepositus (Houart, 1993).

Figs 39-40, 86-87

Dermomurex (Trialatella) sepositus Houart, 1993: 19, Figs 8-9, 24-25

Matériel type examiné: Holotype MNHN.

Localité type: Cameroun, 03°37' N, 09°03' E, 54 m.

Distribution: Cameroun, 54 m.

Remarques: *Dermomurex sepositus* est décrit à partir d'un seul spécimen, encore unique à ce jour. *Dermomurex scalaroides* (de Blainville, 1829), une espèce méditérrannéenne présente jusqu'au Sénégal, possède un intritacalx plus dense et traversé par de fine stries axiales. La coquille de *D. scalaroides* est plus noduleuse et possède 3 ou 4 cordons spiraux.

Les espèces de *Trialatella* ont habituellement 3 varices sur le dernier tour de téléoconque, mais comme supposé par VOKES (1992: 80) pour *Dermomurex leali* Houart, 1991, une espèce du Brésil, il est très probable que des spécimens de *D. sepositus* possédant 6 tours de téléoconque (et non 4,25 comme chez l'holotype) auraient 3 varices sur le dernier tour et non 5 comme chez l'holotype, probablement un spécimen subadulte.

L'holotype de *D. sepositus* mesure 9 mm et la coquille est blanche.

***

Dermomurex sepositus was described from a single specimen, still the only one known today. *Dermomurex (Dermomurex) scalaroides* (de Blainville, 1829) from the Mediterranean, but extending to Senegal, has a different intritacalx. It is minutely spirally striate in *D. sepositus*, while it is more dense and crossed by very fine axial striae in *D. scalaroides*. The shell of *D. scalaroides* is more nodose with usually 3 or 4 low, but apparent spiral cords on the last teleoconch whorl.

Species of *Trialatella* are known to have 3 varices on the last teleoconch whorl, but as seen in other species, and as supposed by VOKES (1992:80) for *D. leali* Houart, 1991, a Brazilian species, it is most probable that specimens of *Dermomurex sepositus* with 6 teleoconch whorls (and not 4.25 as in the holotype) would have 3 varices on the last whorl, and not 5 as in the holotype, probably a subadult shell.

The shell of *D. sepositus* is white, with a length of 9 mm.

Genre *Homalocantha*

Mörch, 1852

Espèce-type: *Murex scorpio* Linnaeus, 1758, par monotypie

Remarques: Le classement du genre *Homalocantha* chez les Muricinae est peut- être momentané et sera probablement modifié ultérieurement, car l'opercule à nucleus latéral rapelle celui des Ocenebrinae, par contre la radula (Figs 17-18), s'éloigne du modèle Ocenebrinae, sans être toutefois typiquement muricine.

***

Remarks: The classification of *Homalocantha* in the Muricinae may be modified later because of the morphology of the operculum with lateral nucleus (typical for species of Ocenebrinae), and of the radula (Figs 17-18), neither similar to the Ocenebrinae nor to typical muricines.

Homalocantha melanamathos
(Gmelin, 1791)
Figs 17-18, 36, 78-79

Murex melanamathos Gmelin, 1791: 3527

Matériel type examiné: le nom de Gmelin est basé sur la figure 1015 de MARTINI (1777).

Localité type: inconnue.

Distribution: Depuis le Ghana jusqu'au nord de l'Angola (région de Luanda), de 0 à 20 m, sur fonds durs.

Remarques: *Homalocantha melanamathos* ressemble superficiellement davantage à un *Hexaplex* qu'à l'espèce-type du genre *Homalocantha*. Toutefois, les caractères conchyliologiques (premiers tours de téléoconque surbaissés; excroissance varicale au dessus de l'ouverture, bien visible à chaque varice), de l'opercule (à nucleus latéral), et de la radula sont ceux d'*Homalocantha* et l'appartenance générique ne laisse aucun doute. *H. melanamathos* paraît apparenté à l'espèce pacifique américaine *H. oxyacantha* (Broderip, 1833).

Le nom *Homalocantha melanamathos* forme *chinii* Biraghi, 1984, fondé sur des

coquilles de Pointe-Noire (Congo), n'a pas de valeur nomenclaturale. Le canal et la spire de cette forme seraient plus courts, selon Biraghi, que chez la forme typique, mais ces caractères sont très variables. Ce sont donc seulement les épines plus longues qui peuvent servir à définir cette forme.

Aucune protoconque complète n'a été observée, mais un exemplaire incomplet du Ghana (Fig. 36) montre cependant qu'elle est multispirale et lisse.

La coquille de *H. melanamathos* est blanche avec les varices et les épines entièrement noires. La taille adulte ne dépasse généralement pas 40 mm, mais peut atteindre exceptionnellement 63 mm (coll. Hattenberger).

***

Homalocantha melanamathos is more similar to *Hexaplex* than to the type species of the genus *Homalocantha*. Nevertheless, conchological characters, as well as the morphology of the operculum and the radula are those of *Homalocantha*. *H. melanamathos* is probably related to the eastern Pacific species *H. oxyacantha* (Broderip, 1833).

The name *Homalocantha melanamathos* form *chinii* Biraghi, 1984 has no nomenclatural value. This form has longer varical spines, a shorter siphonal canal and a lower spire, although most of these characters are very variable and thus inadequate to separate the form on a specific or subspecific level.

The protoconch of *H. melanamathos* is multispiral and smooth. The shell is white with black varices and spines. The average size of an adult shell is of 30-40 mm, but it may exceptionnally reach 63 mm (coll. Hattenberger).

ESPECES MEDITERRANEENNES (MEDITERRANEAN SPECIES)

Deux espèces méditerranéennes appartenant aux Muricinae sont également présentes en Afrique Occidentale: *Hexaplex trunculus* (Linnaeus, 1758) et *Dermomurex scalaroides* (de Blainville, 1829). La première serait uniquement présente aux Iles Canaries et au nord de la Mauritanie (MARCHE-MARCHAD, 1958), tandis que *D. scalaroides* a été récoltée au Sénégal, dans la région de Dakar, par 38 m (MNHN).

***

Two mediterranean species of Muricinae also occur in West Africa: *Hexaplex trunculus* (Linnaeus, 1758) in the Canary Islands and north of Mauritania (MARCHE-MARCHAD, 1958) only, and *Dermomurex scalaroides* (de Blainville, 1829) in the vicinity of Dakar, Senegal, where it was dredged in 38 m (MNHN).

II. MURICOPSINAE Radwin & D'Attilio, 1971

On connait actuellement dix-sept espèces et sous-espèces de Muricopsinae en Afrique Occidentale. Une seule de ces espèces à prédominance méditerranéenne, *Muricopsis (Muricopsis) aradasii* (Monterosato, 1883), est présente aux Iles Canaries et à Madère.

Dix taxa sont inclus dans le sous-genre *Muricopsis (Risomurex)*.

Deux espèces sont des *Favartia*. L'une à protoconque paucispirale, se retrouve uniquement dans l'Archipel du Cap Vert tandis que l'autre, à protoconque multispirale, connaît une distribution géographique plus importante.

Deux espèces de *Pradoxa*, un genre originellement décrit dans les Buccinidae (FERNANDES & ROLAN, 1989), connaissent une distribution géographique limitée à Saõ Tomé.

Les genres *Murexiella* et *Subpterynotus* sont chacun représentés par une espèce.

***

The Muricopsinae are represented in West Africa by seventeen species and subspecies, ten of them belonging to the subgenus *Muricopsis (Risomurex)*.

Two species belong to *Favartia*. Of these, one with "paucispiral" protoconch, lives in the Cape Verde Archipelago. The other, with "multispiral" protoconch, has a wider geographical range.

Two species of *Pradoxa*, a genus originally named in the Buccinidae, have a restricted geographical range, limited to Saõ Tomé.

The genera *Murexiella* and *Subpterynotus* are each represented by a single species.

Muricopsis (Muricopsis) aradasii (Monterosato, 1883), a Mediterranean species, is known from the Canary Islands and from Madeira.

Genre *Muricopsis*

Bucquoy & Dautzenberg, 1882

Sous-genre: *Risomurex* Olsson & Mc Ginty, 1958

Espèce-type: *Ricinula deformis* Reeve, 1846, ICZN Opinion 1623 (1991).

VOKES & HOUART (1986) regroupent quatre espèces d'Afrique Occidentale dans les *Risomurex*, les six autres taxa ont été décrits récemment (HOUART, 1990, 1993, ROLAN & FERNANDES, 1991). Toutes les espèces possèdent une coquille à protoconque paucispirale fortement carénée et ont une distribution géographique restreinte. Elles vivent surtout sur les rochers infralittoraux, jusqu'à 10 m de profondeur.

***

VOKES & HOUART (1986) recorded four species of *Risomurex* from West Africa. The six other taxa were named recently (HOUART, 1990, 1993, ROLAN & FERNANDES, 1991). The shell of *Risomurex* have a strongly keeled, paucispiral protoconch. All the species live in a restricted geographical range, to 10 m depth, on infralittoral rocks.

Muricopsis (Risomurex) fusiformis fusiformis (Gmelin, 1791)

Figs 97-98, 121-124

Murex fusiformis Gmelin, 1791: 3549

Cantharus (Pollia) multigranosus von Maltzan, 1884: 68

Matériel type examiné: *M. fusiformis*: lectotype MNHN (désigné par HOUART & VOKES, 1986: 81); *C. multigranosus*: lectotype ZMB 37205 (désigné par VOKES & HOUART, 1986: 81).

Localités types: *M. fusiformis*, Sénégal; *C. multigranosus*, Gorée.

Distribution: de la Mauritanie (Port Etienne) jusqu'au Sénégal (Ile de Gorée, Dakar), jusqu'à 4 mètres de profondeur, sur rochers infralittoraux.

Remarques: *Muricopsis (Risomurex) fusiformis fusiformis* est un des plus grands *Risomurex* d'Afrique Occidentale. La coquille est reconnaissable par sa forme un peu globuleuse et biconique. De couleur blanchâtre ou d'un brun uniforme, elle peut également présenter une ou deux bandes spirales plus foncées. La taille de la coquille varie de 10 à 15 mm.

***

Muricopsis (Risomurex) fusiformis fusiformis has a large, biconical and weakly globose shell, attaining 10 to 15 mm in length. It is whitish or uniformly brown, with or without darker coloured spiral bands.

Muricopsis (Risomurex) fusiformis punctata Houart, 1990

Figs 89, 100-101, 125-129

Muricopsis (Risomurex) fusiformis punctata Houart, 1990: 53, figs 1-3, 6-9

Matériel type examiné: Holotype MNHN.

Localité type: Praia das Conchas, prov. Moçamedes, Angola.

Distribution: Angola, depuis Bengo jusqu'au nord de Moçamedes, jusqu'à 5 m. de profondeur, sous rochers.

Remarques: La coquille de *M. fusiformis punctata* est plus petite que l'espèce nominale, atteignant une taille de 12 mm. Elle est blanchâtre avec des bandes alternativement plus claires ou plus foncées et des ponctuations brunâtres ou noirâtres à l'intersection des côtes axiales et des cordons spiraux. Elle peut occasionnellement être d'une teinte uniforme.

Une distance de plus de 4000 kilomètres sépare l'espèce nominale de sa sous-espèce. Les mollusques des eaux littorales de la Côte d'Ivoire, du Ghana et du Gabon étant suffisamment connus, l'absence de cette espèce sur une si grande distance est certainement significative. Une coquille vide fut récoltée à l'Ile Pagalu (Annobon Id) dans le Golfe de Guinée (MNHN, coll. Marche-Marchad). Cette localité est douteuse et demande confirmation.

***

A gap of more than 4000 kms separates the nominal subspecies from *M. fusiformis punctata*. The littoral waters of the Ivory Coast, Ghana and Gabon being sufficiently known, the

absence of that species in these regions is probably significant.

A single, dead collected shell was reported from Annobon Island, in the Gulf of Guinea. This locality is doubtful and needs confirmation.

M. fusiformis punctata differs from *M. fusiformis fusiformis* in its coloration, smoother sculpture, and relatively smaller size.

The shell is whitish with darker coloured spiral bands and brown to black spots at the intersection of the spiral cords and axial ribs. It may be occasionally uniformly coloured.

Muricopsis (Risomurex) rutilus rutilus
(Reeve, 1846)
Figs 99, 130-131

Ricinula rutila Reeve, 1846: pl. 6, fig. 49

Matériel type examiné: Lectotype BMNH 1968461 (désigné par VOKES & HOUART, 1986: 80).

Localité type: Ile de Busua, Ghana (désigné par VOKES & HOUART, 1986: 80).

Distribution: Ghana, Ile de Busua.

Remarques: Le lectotype de *Muricopsis rutilus* a été illustré par CERNOHORSKY (1978: fig. 27), qui utilise ce nom pour désigner l'espèce des Caraïbes, connue sous le nom de *Muricopsis (Risomurex) caribbaeus* (Bartsch & Rehder, 1839). Si la coquille est vaguement similaire, elle s'en éloigne toutefois par sa plus grande taille, sa coloration différente et sa sculpture moins accentuée.

M. rutilus a été décrite sans mention de localité. Ce n'est que récemment que la découverte d'un spécimen dans la collection de l'auteur a permis de localiser cette espèce.

Un exemplaire fut erronément illustré par RADWIN & D'ATTILIO (1976: pl. 27, fig. 11) comme *Muricopsis angolensis* (Odhner, 1922), un synonyme de *Orania fusulus* (Brocchi, 1814).

M. rutilus atteint la taille de 13 mm, la coquille est grisâtre avec des bandes plus foncées sous la suture, sur la périphérie du dernier tour, et sur le canal siphonal. L'ouverture est blanche avec des bandes brunes.

***

The lectotype *of M. rutilus* was illustrated by CERNOHORSKY (1978: fig. 27), who used that name to designate *M. (R.) caribbaeus* (Bartsch & Rehder, 1939), a Caribbean species. The shell of *M. caribbaeus* is similar but differs from *M. rutilus* in its larger size, different coloration, and smoother sculpture.

M. rutilus was erroneously illustrated by RADWIN & D'ATTILIO (1976: pl. 27, fig. 11) as *Muricopsis angolensis* (Odhner, 1922), a synonym of *Orania fusulus* (Brocchi, 1814).

M. rutilus reachs a length of 13 mm, the shell is grey with darker coloured bands on the shoulder, the periphery of the last whorl, and the siphonal canal. The aperture is white with brown bands.

Muricopsis (Risomurex) rutilus mariangelae
Rolán & Fernandes, 1991
Figs 88, 106, 117-118, 134-136, 152-153

Muricopsis (Risomurex) rutilus mariangelae Rolán & Fernandes, 1991: 13, figs 1-3, 10, 12, 13, 16

Matériel type examiné: Holotype 15.05/1110, Museo de Ciencias Naturales de Madrid.

Localité type: São Tomé.

Distribution: São Tomé et Príncipe, jusqu'à 6 m. de profondeur.

Remarques: La coquille de *Muricopsis rutilus mariangelae* diffère de la sous-espèce nominale par sa plus petite taille, l'ouverture et le bord columellaire comparativement plus large. Les nodules résultant du croisement des côtes axiales et spirales sont plus bas, les côtes spirales sont plus minces et les fins cordons spiraux intermédiaires sont plus nombreux.

La coquille de *M. rutilus mariangelae* est blanche ou brunâtre avec des bandes plus foncées sous la suture, sur la périphérie et sur le canal siphonal. De nombreuses taches brunes sont souvent présentes sur les côtes spirales. L'ouverture est grisâtre avec des denticules plus clairs et des bandes spirales brunes.

***

Muricopsis rutilus mariangelae differs from the nominal subspecies in its relatively smaller size, broader aperture and columellar lip, lower nodes, narrower spiral cords and more numerous, small, spiral threads. The shell is white or brownish with darker bands on the

shoulder, on the periphery of the last whorl, and on the siphonal canal. There are often dark brown blotches on the spiral cords.

The aperture is grey with lighter coloured denticles, and dark brown bands.

Muricopsis (Risomurex) matildae
Rolán & Fernandes, 1991
Figs 90, 137-138, 150-151

Muricopsis (Risomurex) matildae Rolán & Fernandes, 1991: 17, figs 4-6, 11, 14, 17

Matériel type examiné: Holotype 15.05/1111, Museu de Ciencias Naturales de Madrid.

Localité type: Playa de Esprainha, São Tomé.

Distribution: Ile de São Tomé, jusqu'à 8 m. de profondeur.

Remarques: *Muricopsis matildae* est une petite espèce dont la taille n'excède pas 10 mm, dont la couleur brun-rougeâtre et la protoconque relativement petite et rosâtre la différencie à première vue des autres espèces de *Risomurex* d'Afrique Occidentale. La microsculpture de la protoconque, qui semble être d'une grande importance pour la séparation des ces taxa, est différente de celle de *M. rutilus mariangelae*, coquille morphologiquement assez similaire (Figs 151 & 153).

***

Muricopsis matildae is a small species, reaching 10 mm in length. It differs from the other West African species of *Risomurex* in its reddish colour, and small, pink protoconch. The microsculpture of the protoconch, which seems a good tool for separating some West African species of *Risomurex*, is different from the similar *M. rutilus mariangelae* (Figs 151 & 153).

Muricopsis (Risomurex) principensis
Rolán & Fernandes, 1991
Figs 142-143, 149

Muricopsis (Risomurex) principensis Rolán & Fernandes, 1991: 19, figs 7-8, 15, 18

Matériel type examiné: Holotype 15.05/1112, Museu de Ciencias Naturales de Madrid.

Localité type: Bahía das Agulhas, Ile de Príncipe.

Distribution: Probablement endémique à l'Ile de Príncipe.

Remarques: *Muricopsis principensis* est bien distincte des autres espèces d'Afrique Occidentale. La coquille atteint 14 mm de haut, elle est élancée et possède une spire haute et large. Les côtes axiales et les cordons spiraux sont proéminents sur les premiers tours de spire; l'avant-dernier tour possède une sculpture axiale et spirale quasi obsolète, tandis que le dernier tour est presque lisse.

La protoconque, les premiers tours de spire et le canal siphonal sont blancs, tandis que les trois derniers tours sont noirs. L'ouverture est blanche avec une tache noire sur la partie adapicale de la columelle.

***

Muricopsis principensis is distinct from the other species of *Risomurex*. The shell is slender with a high, broad spire. The sculpture of the first teleoconch whorls consists of prominent axial ribs and spiral cords; penultimate whorl with very weak sculpture; last whorl almost smooth.

The protoconch, the first teleoconch whorls, and the siphonal canal are white, while the three last whorls are black. The aperture is white with a black blotch at the adapical extremity of the columellar lip. Shell up to 14 mm in length.

Muricopsis (Risomurex) seminolensis
Vokes & Houart, 1986
Figs 102, 139-141

Muricopsis (Risomurex) seminolensis Vokes & Houart, 1986: 88, figs 1-3

Matériel type examiné: Holotype MNHN.

Localité type: Banc du Séminole, 38 m, au large de Dakar, Sénégal.

Distribution: Banc du Séminole et Ile de Gorée, jusqu'à 38 m de profondeur, sable.

Remarques: La coquille *de M. seminolensis* atteint la taille de 11 mm. Elle est ocre à brun clair, occasionnellement avec quelques taches plus foncées sur les côtes axiales et 2 ou 3

cordons spiraux brun, formant une bande spirale plus foncée sur la partie abapicale du dernier tour. La protoconque paucispirale, fortement carénée est typique du sous-genre *Risomurex*.

***

The shell of *M. seminolensis* reachs a length of 11 mm, it is ochre to light brown coloured, stained with dark brown on the axial ridges, mostly on the shoulder. Third, fourth and fifth spiral cords on the body are occasionally darker, forming a dark band. The protoconch is paucispiral and strongly keeled, typical of the subgenus.

Muricopsis (Risomurex) suga suga
(Fischer-Piette, 1942)
Figs 103, 112-113, 132-133

Tritonalia (Ocinebrina) suga Fischer-Piette, 1942: 229, pl. 7, figs 9-10

Matériel type examiné: Lectotype MNHN (désigné par VOKES & HOUART, 1986: 82).

Localité type: Ile de Gorée, Sénégal.

Distribution: Ile de Gorée et région de Dakar, Sénégal, jusqu'à 25 m. de profondeur.

Remarques: *M. suga suga* est souvent confondue avec *Trachypollia turricula* (von Maltzan, 1884), un Ergalataxinae (Figs 224-225). *M. suga* en diffère par sa protoconque nettement différente (Figs 103 et 192) et par d'autres caractères expliqués sous *T. turricula*.

La taille de *M. suga suga* dépasse rarement 10 mm (taille maximale: 13 mm). Le lectotype désigné par VOKES & HOUART (1986: 82) a été également illustré par FAIR (1976: pl. 22, fig. 332), tandis que RADWIN & D'ATTILIO (1976) ne mentionnent pas cette epèce.

La coquille est blanchâtre avec des rangées axiales aux tubercules plus foncés. L'ouverture est blanche

***

Muricopsis suga suga is often confused with *Trachypollia turricula* (von Maltzan, 1884), an ergalataxine (Figs 224-225). *M. suga* differs in its paucispiral, keeled protoconch, which is multispiral and conical in *T. turricula* (Figs 103 and 192), and by other differences in shell morphology (see under *T. turricula*).

The shell reachs a length of 13 mm, it is white with tops of each axial rib marked with dark reddish-brown. The aperture is white.

Muricopsis (Risomurex) suga discissus
Houart, 1990
Figs 104-105, 114-116

Muricopsis (Risomurex) suga discissus Houart, 1990: 55, figs 4-5, 10-12

Matériel type examiné: Holotype MNHN.

Localité type: Baia de Santa Maria, Benguela, Angola.

Distribution: Angola, Prov. de Luanda et Benguela, jusqu'à 20 m. de profondeur, sur rochers.

Remarques: *M. suga discissus* diffère de l'espèce nominale par ses côtes axiales et ses cordons spiraux plus nombreux. Elle a été nommée comme sous-espèce de *M. suga suga* pour des raisons identiques à celles de *M. fusiformis punctata*.

La coquille est uniformément brunâtre avec une coloration plus foncée à l'intersection des cordons axiaux et des côtes spirales. Ouverture brunâtre.

***

Muricopsis suga discissus differs from the nominal subspecies in its more numerous spiral and axial sculpture. It was named as a subspecies of *M. suga suga* for the same reasons as for *M. fusiformis punctata* (see under that name).

The shell is uniformly light brown or dark brown with darker coloration at the intersection of the axial ribs and the spiral cords. The aperture is brownish.

Muricopsis (Risomurex) gofasi
Houart, 1993
Figs 107, 144

Muricopsis (Risomurex) gofasi Houart, 1993: 21, figs 15-16, 28

Matériel type examiné: Holotype MNHN.

Localité type: Praia das Conchas, Prov. Namibe, Angola.

Distribution: Angola, Prov. Namibe et Bengo.

Remarques: *Muricopsis gofasi* diffère de *M. fusiformis punctata*, avec laquelle elle est sympatrique, en étant comparativement plus grande, plus solide, en possédant des côtes axiales moins nombreuses et plus larges et des cordons spiraux plus larges.

Elle atteint une hauteur de 13 mm. La couleur est grisâtre ou brun clair avec de petites taches brunes sur les cordons spiraux. La coquille est parfois uniformément orange pâle.

***

Muricopsis gofasi differs from *M. fusiformis punctata*, with which it is sympatric, in being relatively larger, stouter and more shouldered. It has also fewer and broader axial ribs and broader spiral cords.

The shell is grey or light brown with small brown blotches on the spiral cords, occasionally uniformly light orange.

Genre *Pradoxa*

Fernandes & Rolán, 1993

Paradoxa Fernandes & Rolán, 1990a: 342, not *Paradoxa* Marshall, 1894
Paradoxon Fernandes & Rolán, 1990b: 67, not *Paradoxon* Fleutiaux, 1903

Commentaires: Le genre *Pradoxa* contient actuellement deux espèces Ouest-africaines dont la taille n'excède pas 5 mm de haut. Le genre fut créé dans les Buccinidae, mais la radula est typique des Muricidae (Figs 91-93). La coquille est caractéristique, non seulement par sa très petite taille, mais également par sa protoconque ornée de double ou de triple côtes spirales très prononcées (Figs 146 & 147). L'ouverture est petite et le canal siphonal court par rapport à la très haute spire. La coquille est entièrement brun foncé ou noire.

***

The genus *Pradoxa* was originally named in the Buccinidae, but the radula is typical muricid (Figs 91-93). The genus presently contains two West African species. The shell is very small, with a maximum length of 5 mm, a high spire, a small aperture, and a short siphonal canal. The protoconch bears 2 or 3 strong spiral cords (Figs 146 & 147). The shell is dark brown or black.

Espèce-type: *Paradoxa confirmata* Fernandes & Rolán, 1990, par désignation originale.

Pradoxa confirmata
(Fernandes & Rolán, 1990)
Figs 91, 119, 145-146

Paradoxa confirmata Fernandes & Rolán, 1990: 343, text fig. 1 (B), figs 4-7

Matériel type examiné: Holotype 15.05/1041, Museo Nacional de Ciencias Naturales de Madrid.

Localité type: Ile de São Tomé.

Distribution: Probablement endémique à l'Ile de São Tomé.

Remarques: *Pradoxa confirmata* atteint la taille de 4,7 mm. La protoconque est large. Les tours de téléoconque sont ornés de nombreuses côtes axiales et de 3 ou 4 cordons spiraux. Leur intersection donne naissance à de petites nodosités. La coquille est entièrement brun-noirâtre.

***

Shell up to 4.7 mm in length, entirely blackish-brown. The protoconch is relatively large. Teleoconch whorls with numerous axial ribs and 3 or 4 spiral cords with small, strong nodes at their intersection, giving a nodular appearance to the shell.

Pradoxa thomensis
(Fernandes & Rolán, 1990)
Figs 92-93, 120, 147-148

Paradoxa thomensis Fernandes & Rolán, 1990: 345, figs 1-3

Matériel type examiné: Holotype 15.05/1042, Museo Nacional de Ciencias Naturales de Madrid.

Localité type: Ile de São Tomé.

Distribution: Probablement endémique à l'Ile de São Tomé.

Remarques: La coquille de *M. thomensis* est plus petite que la précédente, atteignant une hauteur de 3,6 mm. Les cordons spiraux sont plus

minces et plus nombreux, tandis que les côtes axiales sont plus hautes et plus larges. La coquille est entièrement brun-noirâtre.

***

The shell of *P. thomensis* is smaller than the previous one, with a maximum length of 3.6 mm. The spiral cords are narrower and more numerous, and the axial ribs are higher and broader. The shell is entirely blackish-brown.

Genre *Favartia*

Jousseaume, 1880

Espèce type: *Murex breviculus* Sowerby, 1834, par désignation originale

Favartia burnayi Houart, 1981
Figs 95-96, 109, 161-162

Murex solidus A. Adams, 1853: 267 (not *Murex solidus* Anton, 1839).

Favartia burnayi Houart, 1981: 79, figs 1-4

Matériel type examiné: *F. burnayi*: holotype IRSNB IG 26282; *M. solidus*: holotype BMNH 1970099.

Localités types: *F. burnayi*: St. Vincent, Archipel du Cap Vert.; *M. solidus*: Ichiboe, Afrique Occidentale.

Distribution: l'espèce est endémique à l'Archipel du Cap Vert.

Remarques: *Favartia burnayi* fut à l'origine comparée à *F. incisa* (Broderip, 1833), une espèce Ouest-américaine et à *F. emersoni* Radwin & D'Attilio, 1976 d'Afrique Occidentale.

Favartia burnayi atteint une taille plus grande que *F. emersoni*, ses côtes axiales sont plus larges et elle possède des cordons spiraux moins nombreux, plus solides et plus larges. Outre ces différences, la protoconque est paucispirale chez *F. burnayi*, ce qui explique peut-être en partie son endémisme, et multispirale chez *F. emersoni*.

La coquille est blanchâtre, l'extrémité du canal siphonal est occasionnellement teintée de brun. La taille varie de 17 à 27 mm.

***

Favartia burnayi differs from the West African *F. emersoni* Radwin & D'Attilio, 1976 in being relatively larger with broader axial ribs, fewer, more solid and broader spiral cords. The protoconch is paucispiral in *F. burnayi* while conical and multipiral in *F. emersoni*.

The shell is whitish, the tip of the siphonal canal is occasionally brown coloured. It reachs a length of 27 mm.

Favartia emersoni Radwin & D'Attilio, 1976
Figs 110, 160

Murex gravidus Hinds, 1844: 128 (not *Murex gravidus* Dujardin, 1837)

Favartia emersoni Radwin & D'Attilio, 1976: 147, pl. 24, fig. 7, n.n. pro *Murex gravidus* not *Murex gravidus* Dujardin, 1837

Matériel type examiné: holotype BMNH 1952.10.12.4.

Localité type: Cape Blanco, 60 fms.

Distribution: de la Mauritanie jusqu'en Angola, de 10 à 50 m. de profondeur.

Remarques: FAIR (1976: pl. 20, fig. 291) illustre l'holotype de cette espèce, tout en mentionnant le fait que *Murex gravidus* est un nom préoccupé. Les différences morphologique existant entre la coquille de *F. emersoni* et celle de *F. burnayi* sont indiquées sous ce dernier nom.

La coquille est blanchâtre et d'une taille variant entre 16 et 26 mm.

***

The holotype of *Murex gravidus* is illustrated by FAIR (1976: pl. 20, fig. 291). For comparison of *F. emersoni* with *F. burnayi*, see under that name.

The shell is whitish and measures from 16 to 26 mm in length.

Genre *Murexiella*

Clench & Pérez Farfante, 1945

Espèce-type: *Murex hidalgoi* Crosse, 1869, par désignation originale

Murexiella bojadorensis (Locard, 1897)
Figs 94, 111, 154-156

Murex bojadorensis Locard, 1897: 304, pl. 15, figs 14-16

Murex asteriae Nicolay, 1972: 11, text figs

Matériel type examiné: *M. bojadorensis*: holotype MNHN.

Localités types: *M. bojadorensis*: Cap Bojador, 103 m; *M. asteriae*: Somone, 12 kms au nord de M'Bur, Sénégal.

Distribution: Du Cap Bojador, Sahara Occidental, jusqu'au Ghana, de 2 m. (*M. asteriae*) jusque 103 m. (holotype de *M. bojadorensis*). Des exemplaires sont également dragués par 160 à 245 m. de profondeur aux Iles Canaries.

Remarques: Incontestablement, *M. bojadorensis* est une des espèces de Muricidae d'Afrique Occidentale les plus recherchées par les collectionneurs, tant pour sa variété de formes que pour ses coloris. *Murex asteriae* possède des épines plus longues et plus droites, sinon la coquille est identique au *F. bojadorensis* typique. NICOLAY (1972: 11) décrit la protoconque *de M. asteriae* comme étant formée de 1.5 tours, alors que *M. bojadorensis* possède 3 tours de protoconque. Il est probable que la protoconque du spécimen décrit ait été érodé, l'aspect quasiment paucispiral atteint à cause de l'érosion pouvant aisément prêter à confusion.

M. bojadorensis est une espèce de grande taille pour le sous-genre, la coquille atteignant 50 mm, elle varie du blanc au brun clair ou brun foncé avec des cordons spiraux et des épines généralement plus foncés.

***

Murexiella bojadorensis is one of the most sought after muricid species from West Africa. *Murex asteriae* has longer and straighter spines, otherwise the shell is similar to typical specimens of *M. bojadorensis*. The protoconch of *M. asteriae* was originally described as having 1.5 whorls whereas *M. bojadorensis* has a protoconch consisting of 3 whorls. It is most probable that the described protoconch of *M. asteriae* was partly eroded, what could explain this difference.

M. bojadorensis reachs a length of 50 mm, it varies from white to light or dark brown with darker spiral cords and spines.

Genre *Subpterynotus*

Olsson & Harbison, 1953

Espèce type: *Murex textilis* Gabb, 1873, par désignation originale.

Subpterynotus exquisitus (Sowerby, 1904)
Figs 108, 157-159

Murex exquisitus Sowerby, 1904: 176, text fig.

Matériel type examiné: 3 syntypes: BMNH 1904.12.23.148; IRSNB IG 10591; coll. R. Houart.

Localité type: au large du Sahara Occidental (désigné ici).

Distribution: Sahara Occidental, entre 75 et 130 m (cf. remarques).

Remarques: SOWERBY (1904) n'ayant pas désigné d'holotype pour *S. exquisitus* et la description originale étant basée sur trois spécimens, l'appellation "holotype" utilisée par FAIR (1976: 41, pl. 19, fig. 271), par RADWIN & D'ATTILIO (1976: 215, 254, text fig. 157), par KAICHER (1980: 2525) et par moi-même (HOUART, 1980: 79) pour désigner le spécimen du BMNH, est donc erronée. Il s'agit en fait d'un syntype. Les deux autres syntypes ont été retrouvés entretemps (HOUART, 1980 et 1981).

Les trois spécimens proviennent d'un même lot, de localité inconnue, ramené par l'Amiral Keppel. D'autres coquilles décrites par Sowerby, dans le même article consacrés aux espèces de la collection de l'Amiral Keppel, proviennent d'Afrique Occidentale. On peut dès lors imaginer que *S. exquisitus* provient de la même région, supposition que j'ai émise (HOUART,

1980), en illustrant le syntype de l'IRSNB. Le syntype de ma collection fut illustré par ABBOTT & DANCE (1982: 141), qui mentionne également l'Afrique Occidentale comme répartition géographique. Rien n'était moins certain à l'époque.

Cette espèce n'a apparemment plus été récoltée depuis sa description, en 1904. Ce n'est que 87 ans plus tard, en 1991, que j'eus l'immense et agréable surprise de découvrir un spécimen parmi d'autres Muricidae. Cet exemplaire a été ramené à la surface lors de dragages effectués au nord de l'Afrique Occidentale, au large du Sahara Occidental. Il fut récolté par une profondeur de 90 m. Les dragages en question ayant été effectués entre 75 et 130 m, la profondeur reste approximative, mais la localité est certaine.

L'exemplaire (Figs 158-159) est quasi identique aux trois syntypes, quoique légèrement plus grand. La taille de *S. exquisitus* varie de 22 mm (syntype BMNH) à 33.9 mm (Sahara Occidental), la coquille est blanche avec une bande brune sous la suture, à la base du dernier tour, et sur le canal siphonal. La face adaperturale des varices du dernier tour est blanche chez les syntypes et brun clair chez l'exemplaire dragué au large du Sahara Occidental. L'ouverture est blanche avec des bandes brunes.

***

The term "holotype" used by FAIR (1976: 41, pl. 19, fig. 271), by RADWIN & D'ATTILIO (1976: 215, 254, text fig. 157), by KAICHER (1980: 2525), and by myself (HOUART, 1980: 79) to designate the specimen of *S. exquisitus* in the BMNH is erroneous, since SOWERBY (1904) never designated a holotype. There were originally three specimens (syntypes), all of them from the collection of Admiral Keppel. One is in the BMNH (Fig. 157), another was located in the Institut Royal des Sciences Naturelles de Belgique (HOUART, 1980 and 1981), the third specimen is now in my collection.

The three specimens come from an unknown locality, but, as it was suggested by HOUART (1980), they could have originated from West Africa. Other shells, all from the Admiral Keppel collection, in the same article by Sowerby, were collected off West Africa. ABBOTT & DANCE (1982: 141) illustrate the syntype, now in the author's collection, and also mention West Africa as the geographical range.

The species apparently had not been collected since its description, in 1904. Only some 87 years later, in 1991, I was pleasantly surprised to discover a specimen in a lot of muricids. The shell had been dredged off Western Sahara, West Africa, at 90 m depth. These dredgings were made between 75 and 130 m, the depth of 90 m is thus approximate, but the locality is certain.

The specimen (Figs 158-159) is almost identical to the syntypes, although somewhat larger. The length of *S. exquisitus* varies from 22 mm (syntype BMNH) to 33.9 mm (Western Sahara). It is white with a brown band on the shoulder, at the base of the last whorl, and on the siphonal canal. The adapertural side of the varices of the last whorl is white in the syntypes and pale brown in the specimen from Western Sahara. The aperture is white with brown bands.

ESPECE MEDITERRANEENNE (MEDITERRANEAN SPECIES)

Une seule espèce de Muricopsinae à prédominance méditerranéenne, *Muricopsis (Muricopsis) aradasii* (Monterosato, 1883), est présente aux Iles Canaries (NORDSIECK & GARCIA-TALAVERA, 1979) et à Madère (HOUART & ABREU, 1994). Cette espèce est apparemment absente du continent.

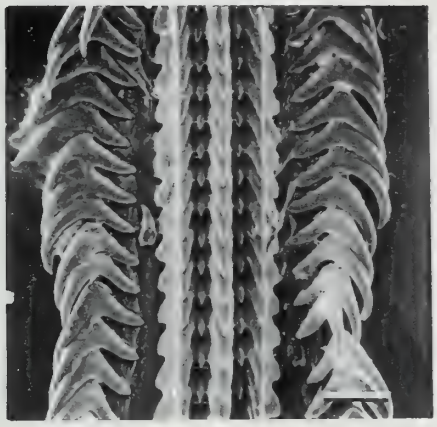
***

A single species of Mediterranean Muricopsinae, *Muricopsis (Muricopsis) aradasii* (Monterosato, 1883), is known from the Canary Islands (NORDSIECK & GARCIA-TALAVERA, 1979) and from Madeira (HOUART & ABREU, 1994). The species has not yet been recorded from the continent

Figures 1-6 (radulas)
(échelles: 100 µm)

1-4. *Bolinus cornutus* (Linnaeus, 1758)
1-2. Sénégal
3-4. Forme "*tumulosus*", Iles Canaries

5-6. *Hexaplex bifasciatus* (A. Adams, 1853), Boavista, Cap Vert



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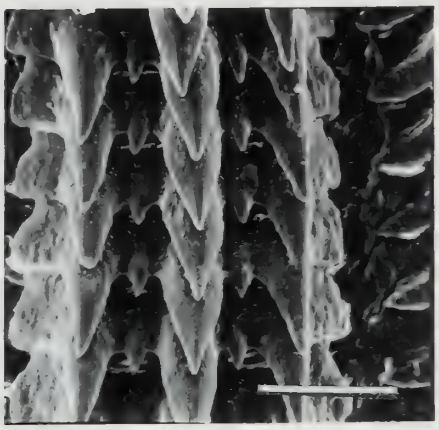

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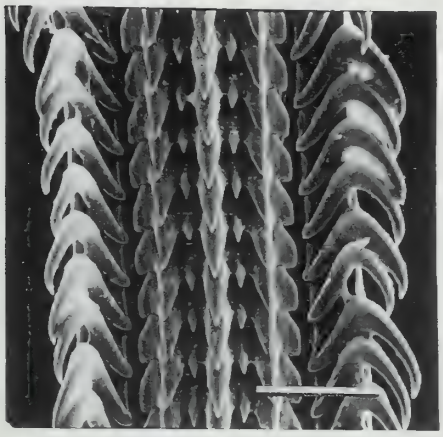

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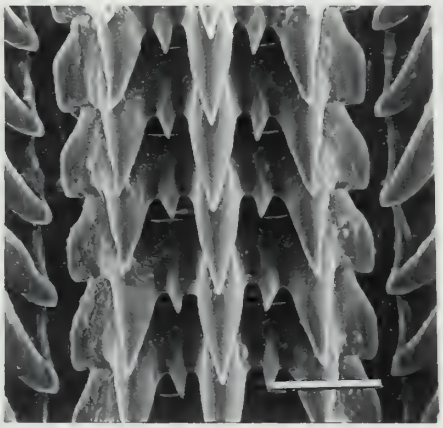

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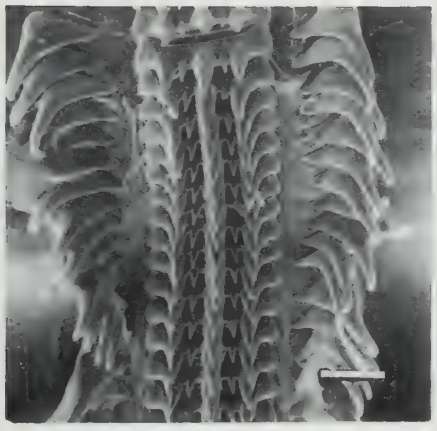

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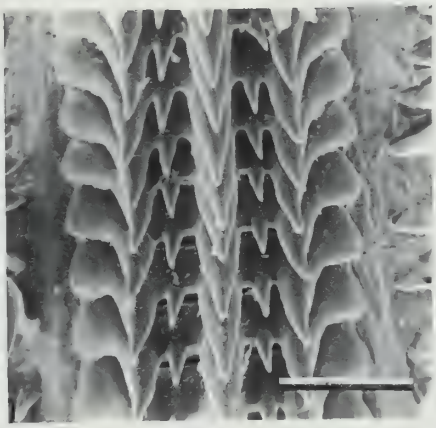

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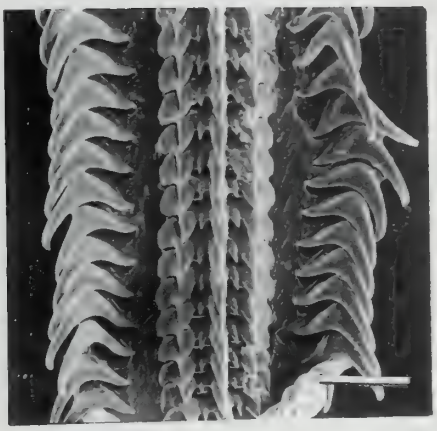
Figures 7-12 (radulas)
(échelles: figs 7-11 = 100 µm; fig. 12 = 50 µm)

7-10. *Hexaplex duplex* (Röding, 1798)
7-8. Sénégal
9-10. Iles Canaries

11. *Hexaplex saharicus ryalli* Houart, 1993, Ghana

12. *Hexaplex megacerus* (Sowerby, 1834), Barra do Dande, Angola



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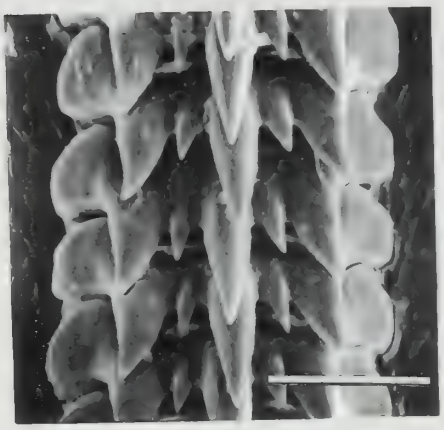

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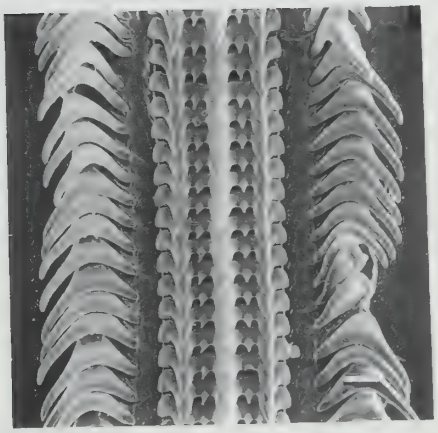

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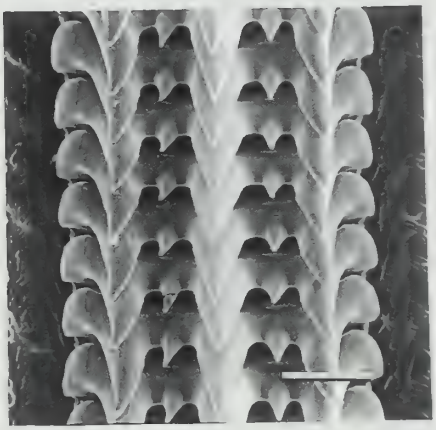

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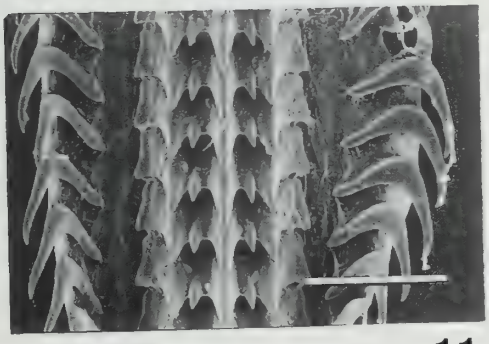

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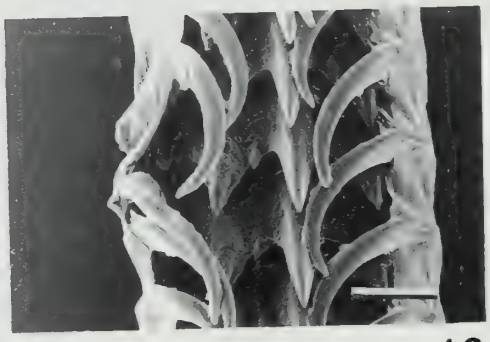

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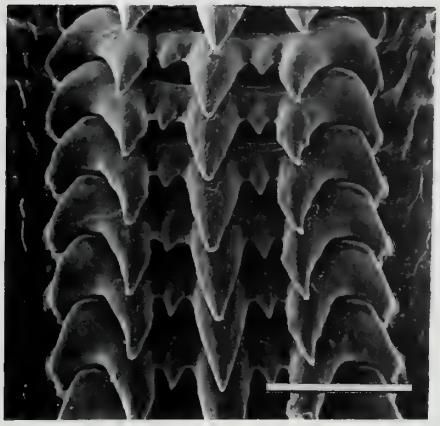
Figures 13-18 (radulas)
(échelles: figs 13-16 = 100 µm; figs. 17-18 = 10 µm)

13-16. *Hexaplex rosarium* (Röding, 1798)
13. Luanda, Angola
14. Cap Vert
15-16. Cap Vert

17-18. *Homalocantha melanamathos* (Gmelin, 1791), Corimbo



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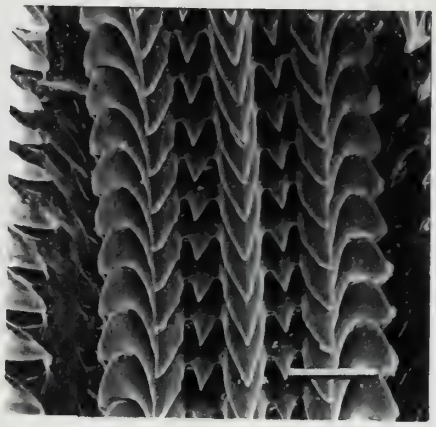

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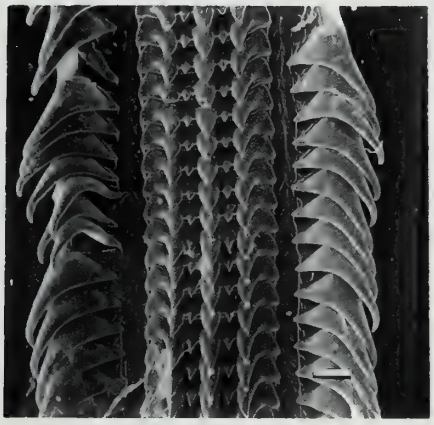

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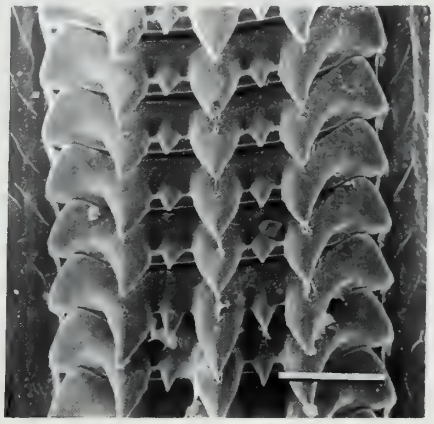

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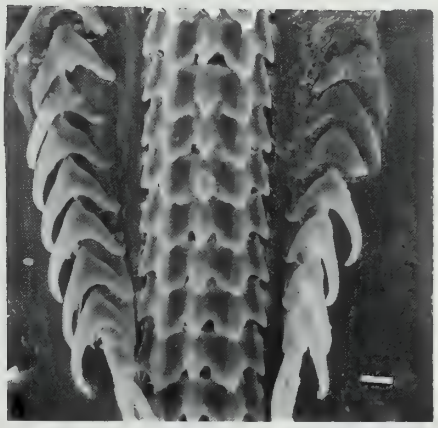

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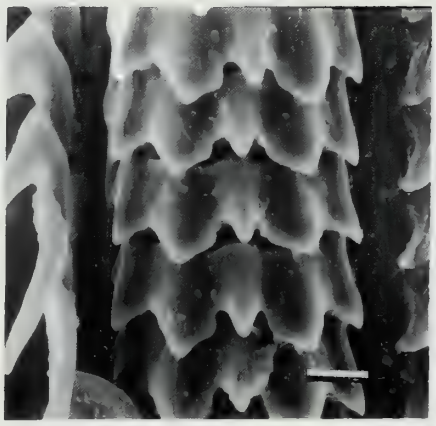

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Figures 19-28 (radulas et protoconques)
(Protoconques: échelles = 0,5 mm)

19-20. *Attiliosa goreensis* Houart, 1993, Gorée, Sénégal (échelles: fig. 19 = 50 µm, fig. 20 = 20 µm)

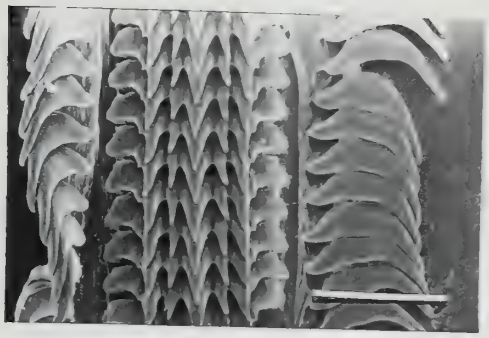
21. *Bolinus cornutus* (Linnaeus, 1758)

22. *Hexaplex duplex* (Röding, 1798)

23. *Hexaplex rosarium* (Röding, 1798)

24-26. *Hexaplex saharicus saharicus* (Locard, 1897)

27-28. *Hexaplex megacerus* (Sowerby, 1834)



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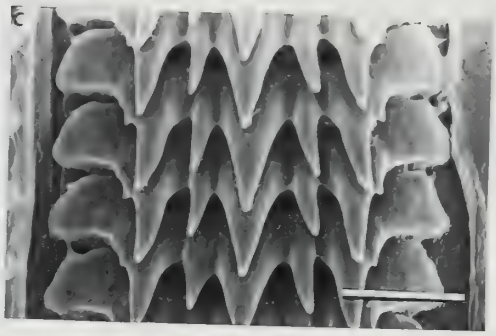

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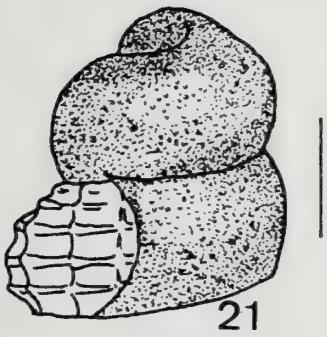

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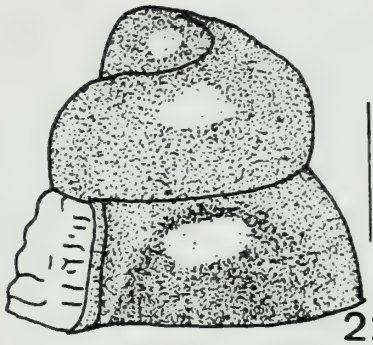

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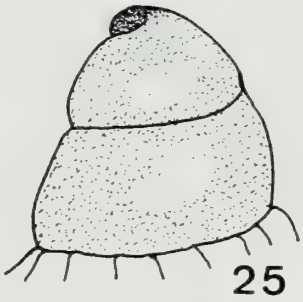

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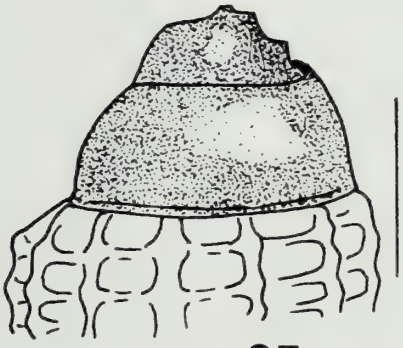

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Figures 29-40 (protoconques)
(échelles: 0,5 mm)

29-30. *Hexaplex saharicus ryalli* Houart, 1993

31. *Hexaplex angularis* (Lamarck, 1822)

32. *Hexaplex varius* (Sowerby, 1834) (forme *clausii*)

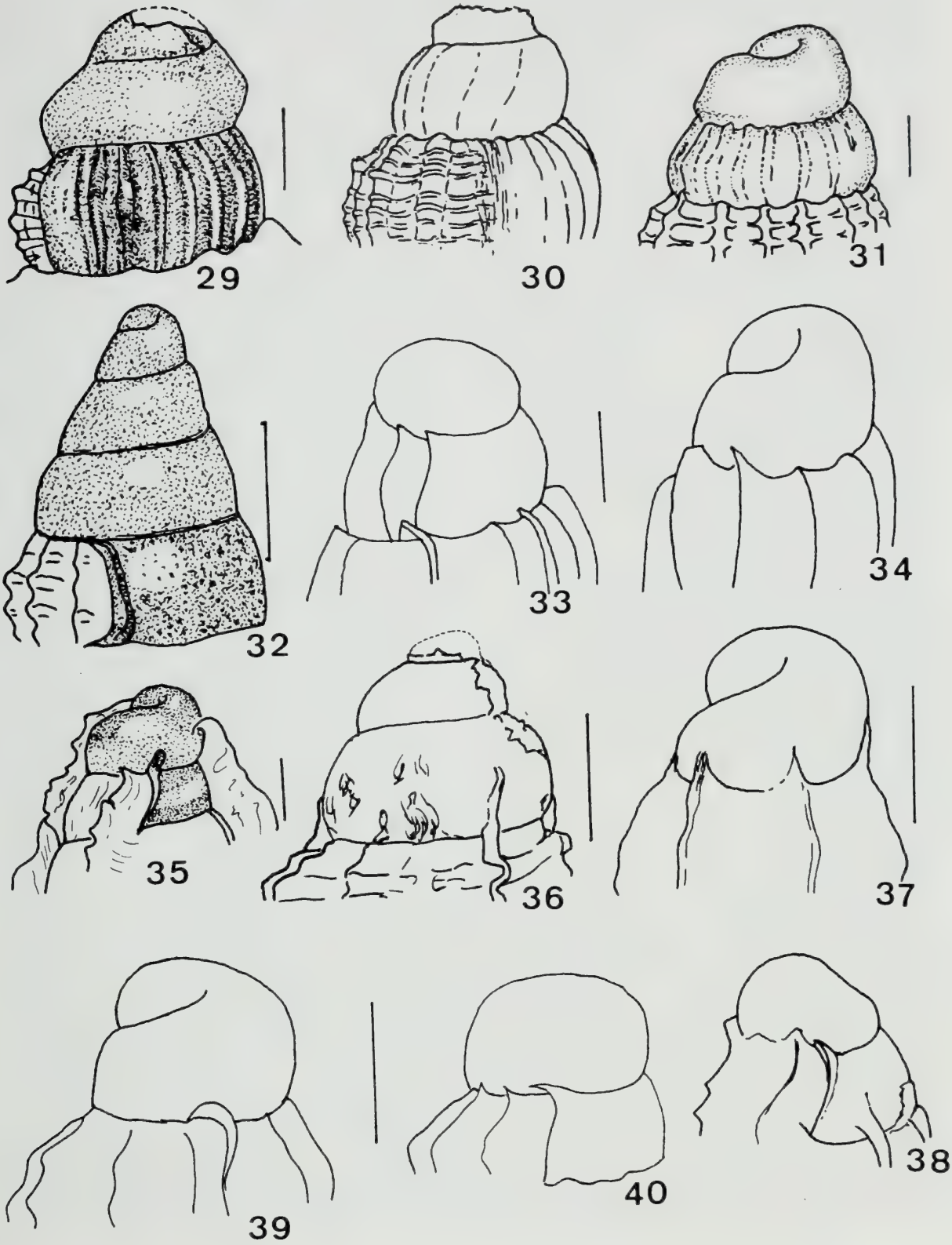
33-34. *Pterynotus leucas* (Fischer, 1897)

35. *Purpurellus gambiensis* (Reeve, 1845)

36. *Homalocantha melanamathos* (Gmelin, 1791)

37-38. *Attiliosa goreensis* Houart, 1993

39-40. *Dermomurex sepositus* Houart, 1993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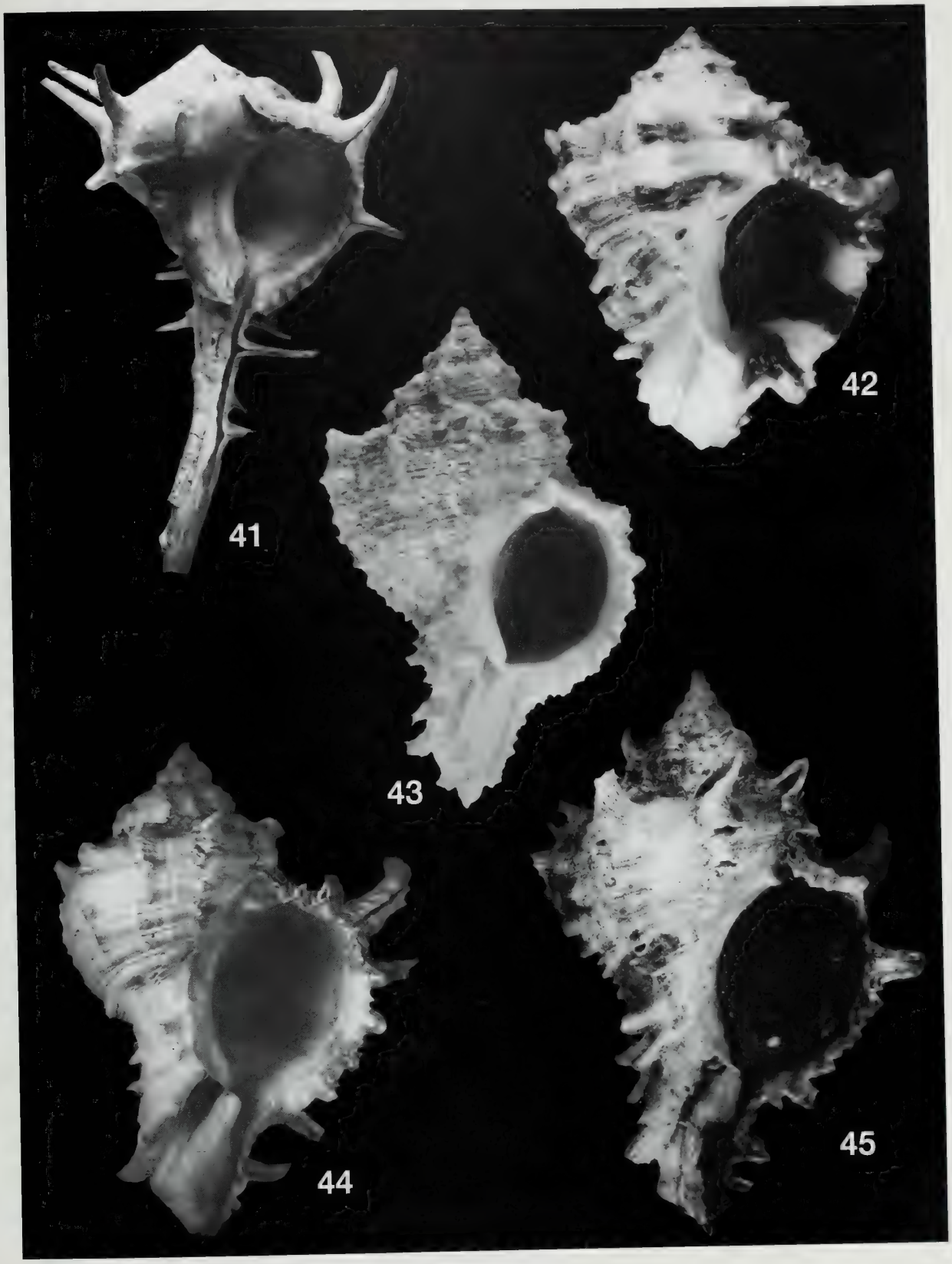
Figures 41-45

41. *Bolinus cornutus* (Linnaeus, 1758), Sénégal, RH, 135 mm

42. *Hexaplex bifasciatus* (A. Adams, 1853), Cap Vert, RH, 77,5 mm

43-45. *Hexaplex duplex* (Röding, 1798)
43. Mauritanie (juvénile), RH, 53,1 mm
44. holotype de *Murex hoplites* Fischer, 1876, MNHN, 86,4 mm
45. Sénégal (juvénile), IRSNB IG 10591, 72 mm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Figures 46 - 49

46. *Bolinus cornutus* (Linnaeus, 1758), Sénégal, RH, 145 mm

47-48. *Hexaplex megacerus* (Sowerby, 1834)
47. Abidjan, Côte d'Ivoire, RH, 115 mm
48. Ghana, RH, 96 mm

49. *Hexaplex saharicus saharicus* (Locard, 1897), Cap Blanc, Sahara, holotype MNHN, 28,8 mm

46

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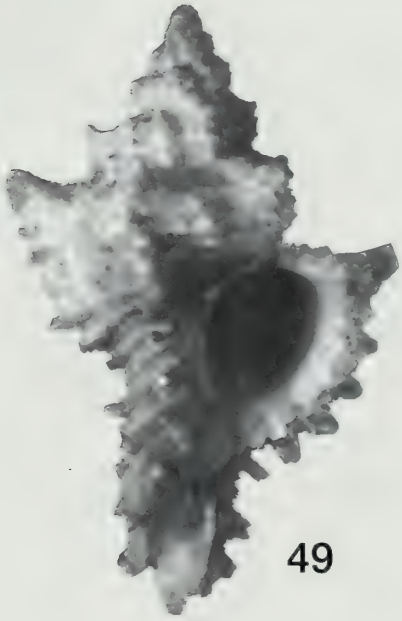


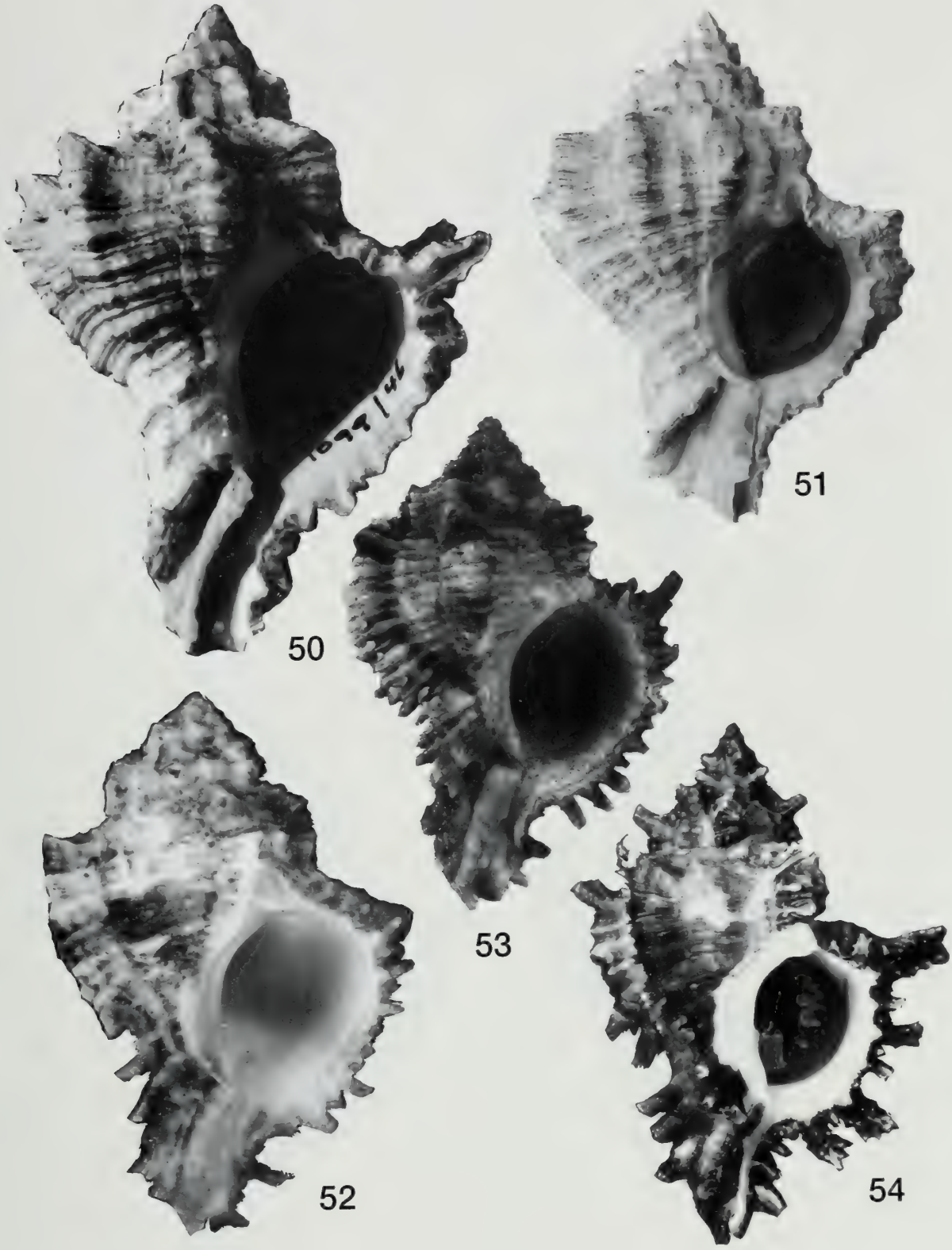
49

Figures 50-54

50 - 51. *Hexaplex duplex* (Röding, 1798)
50. Holotype de *Murex turbinatus* Lamarck, 1822, photo G. Dajoz, (MHNG 1099/46), 63,3 mm
51. Teresitas Beach, Iles Canaries, RH, 89 mm

52-53. *Hexaplex rosarium* (Röding, 1798)
52. Cap Vert, RH, 93 mm
53. Lectotype (désigné ici) de *Murex sowerbianus* Poirier, 1883, Sénégal, MNHN, 48,5 mm

54. *Hexaplex megacerus* (Sowerby, 1834), Gabon, RH, 88 mm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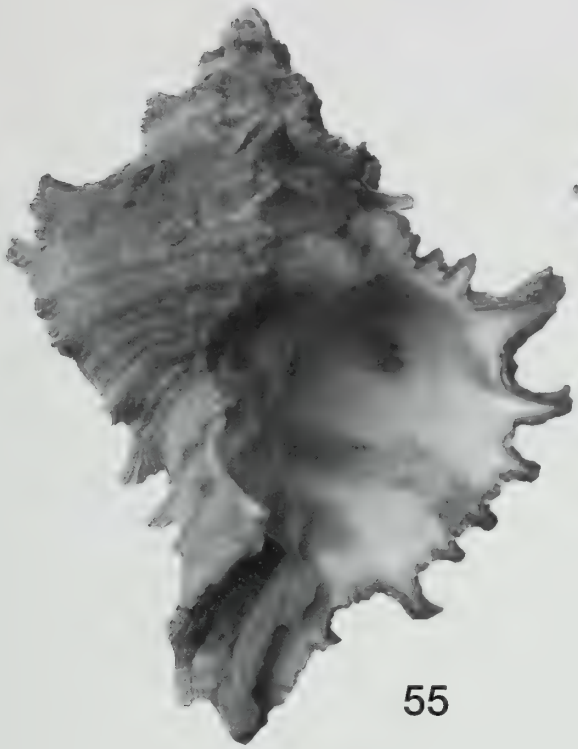
Figures 55-58

55-56. *Hexaplex duplex* (Röding, 1798)
55. Sénégal, RH, 193 mm
56. Fadioush, Sénégal, RH, 195 mm

57-58. *Hexaplex rosarium* (Röding, 1798)
57. Cacuaco, Bengo, Angola, RH, 132 mm
58. Ilha de Luanda, Angola, RH, 90 mm



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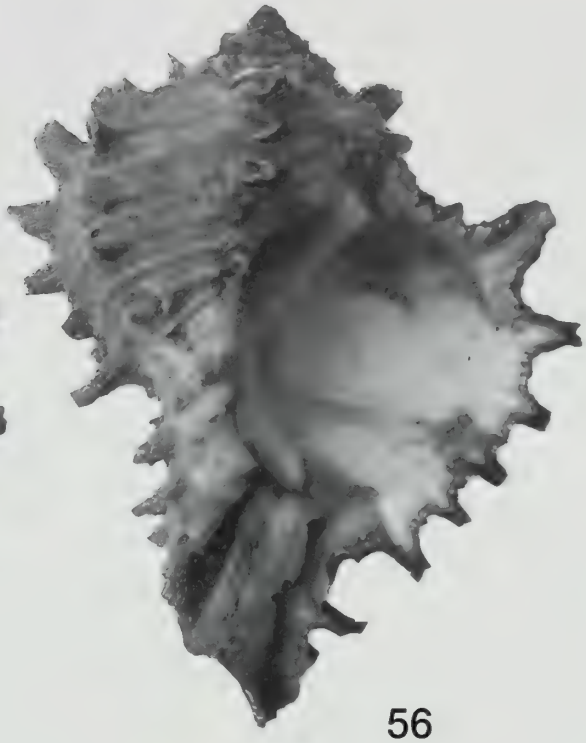

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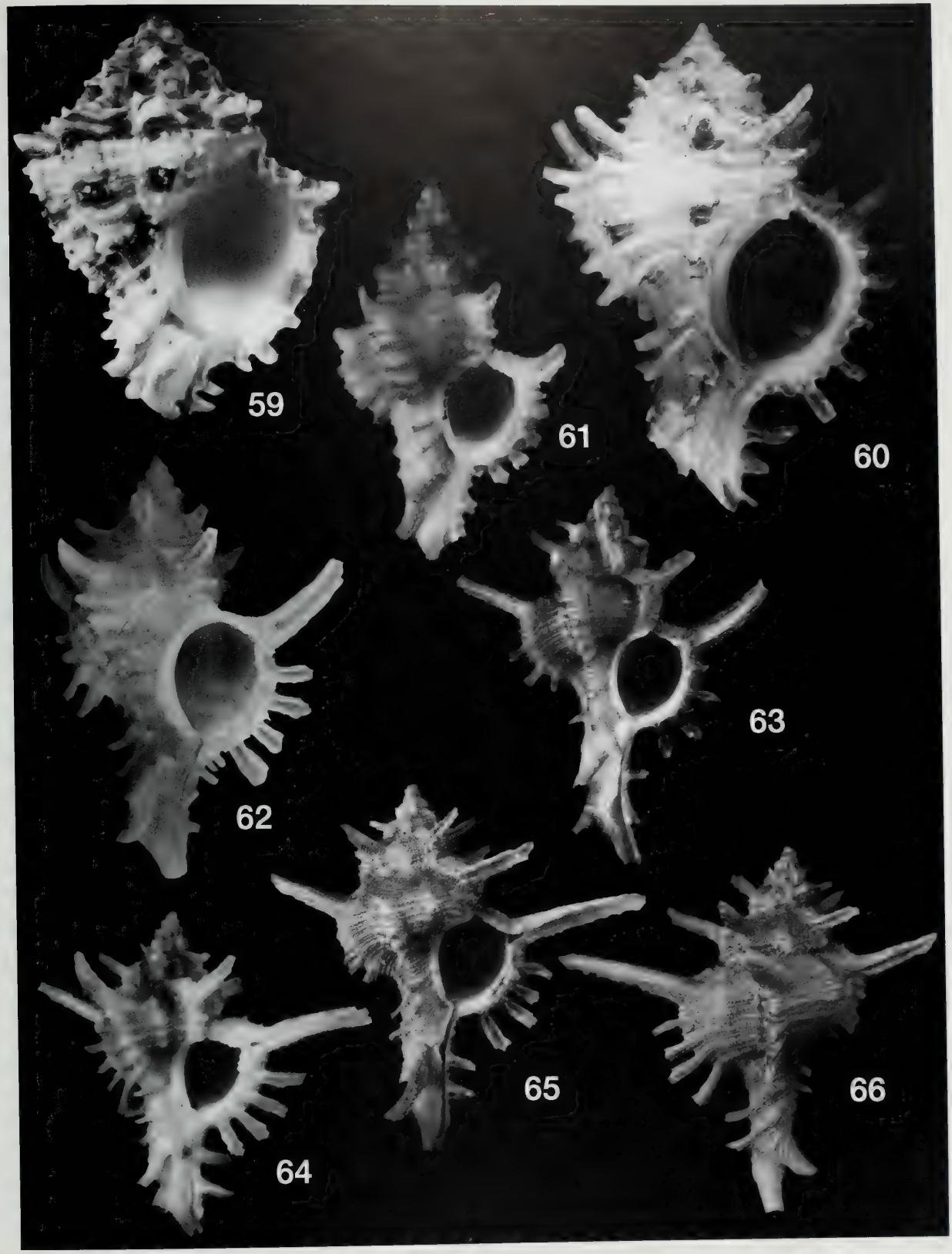
Figures 59-66

59-60. *Hexaplex rosarium* (Röding, 1798)
59. Sao Tomé, RH, 65,5 mm
60. Angola, RH, 94,5 mm

61-62. *Hexaplex saharicus saharicus* (Locard, 1897)
61. Maroc, RH, 51.2 mm
62. Sénégal, RH, 68 mm

63-66. *Hexaplex saharicus ryalli* Houart, 1993
63. Adjua, Ghana, paratype, coll. P. Ryall, 45 mm
64. Mia-Mia, West Ghana, coll. P. Ryall, 38,1 mm
65-66. Abidjan, Côte d'Ivoire, holotype MNHN, 41,2 mm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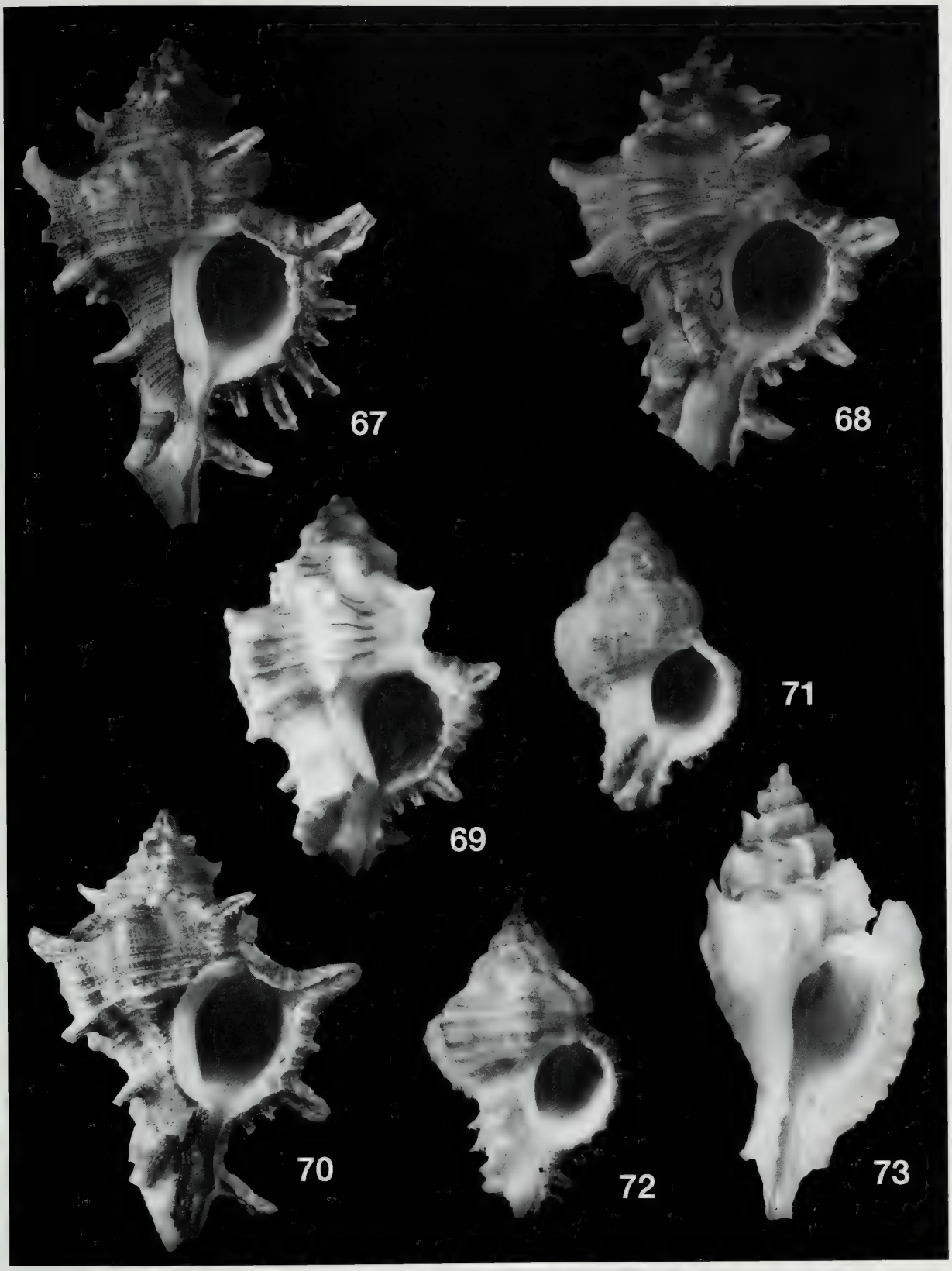
Figures 67-73

67-70. *Hexaplex varius* (Sowerby, 1834)
67. Pointe Noire, Congo (forme *clausii*), MNHN, 56 mm
68. Pointe Noire, Congo, MNHN, 42,5 mm
69. Gabon, coll. P. Bernard, 39 mm
70. Pointe Noire, Congo (forme *clausii*), MNHN, 44 mm

71-72. *Hexaplex angularis* (Lamarck, 1822)
71. Mauritanie, RH, 28,5 mm
72. Sénégal, RH, 30,5 mm

73. *Pterynotus leucas* (Fischer, 1897), paralectotype MNHN, 25 mm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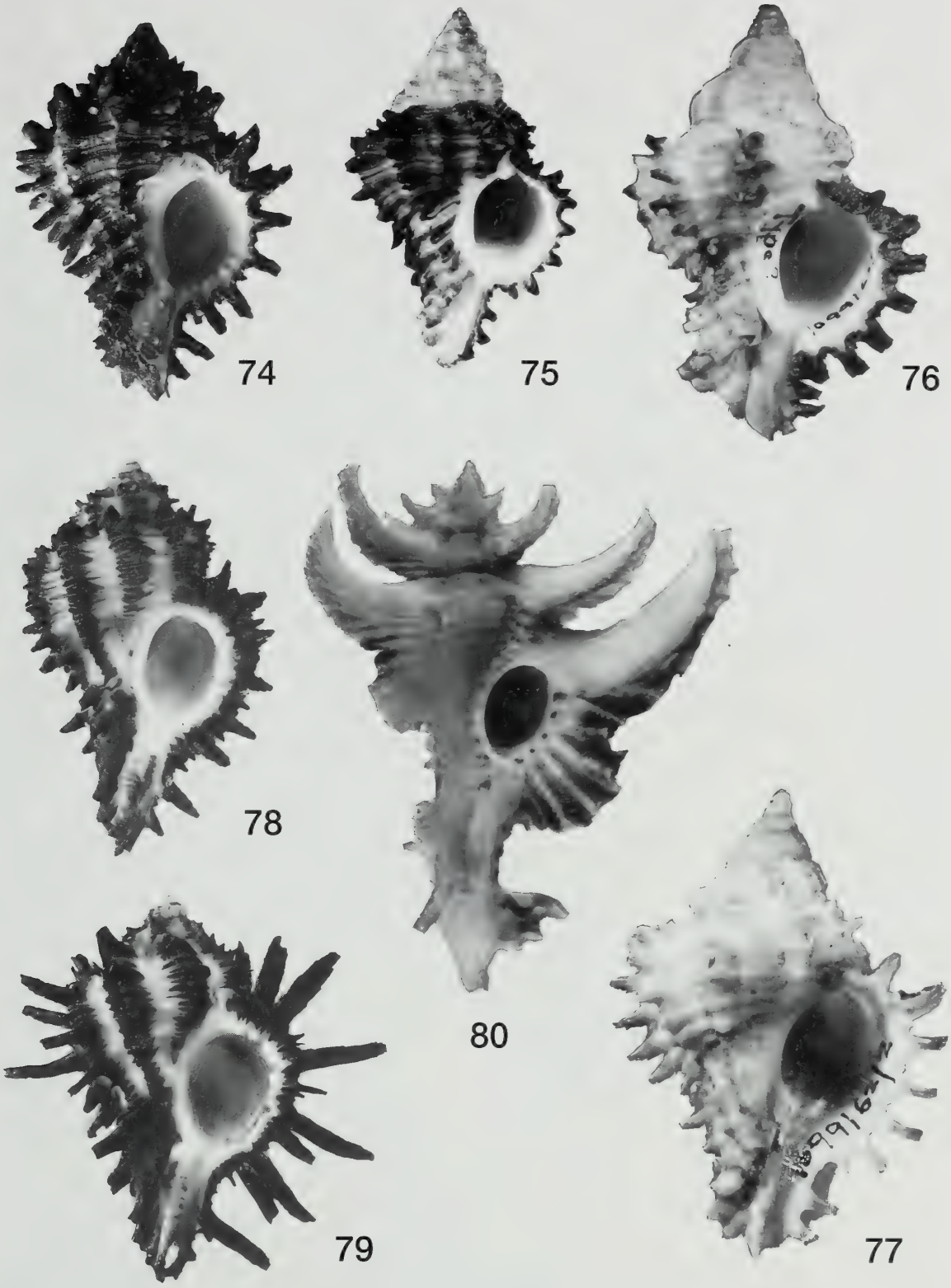
Figures 74-80

74-77. *Hexaplex angularis* (Lamarck, 1822)
74. Lectotype de *Murex hirsutus* Poirier, 1883, MNHN, 43,5 mm
75. Sénégal, IRSNB IG 10591, 35 mm
76-77. Syntypes MHNG 1099/62/1-2, 76: 44,5 mm; 77: 33 mm

78-79. *Homalocantha melanamathos* (Gmelin, 1791), RH, Gabon
78: 46,1 mm
79: 34,2 mm

80. *Purpurellus gambiensis* (Reeve, 1845), Sekondi, Ghana, RH, 61 mm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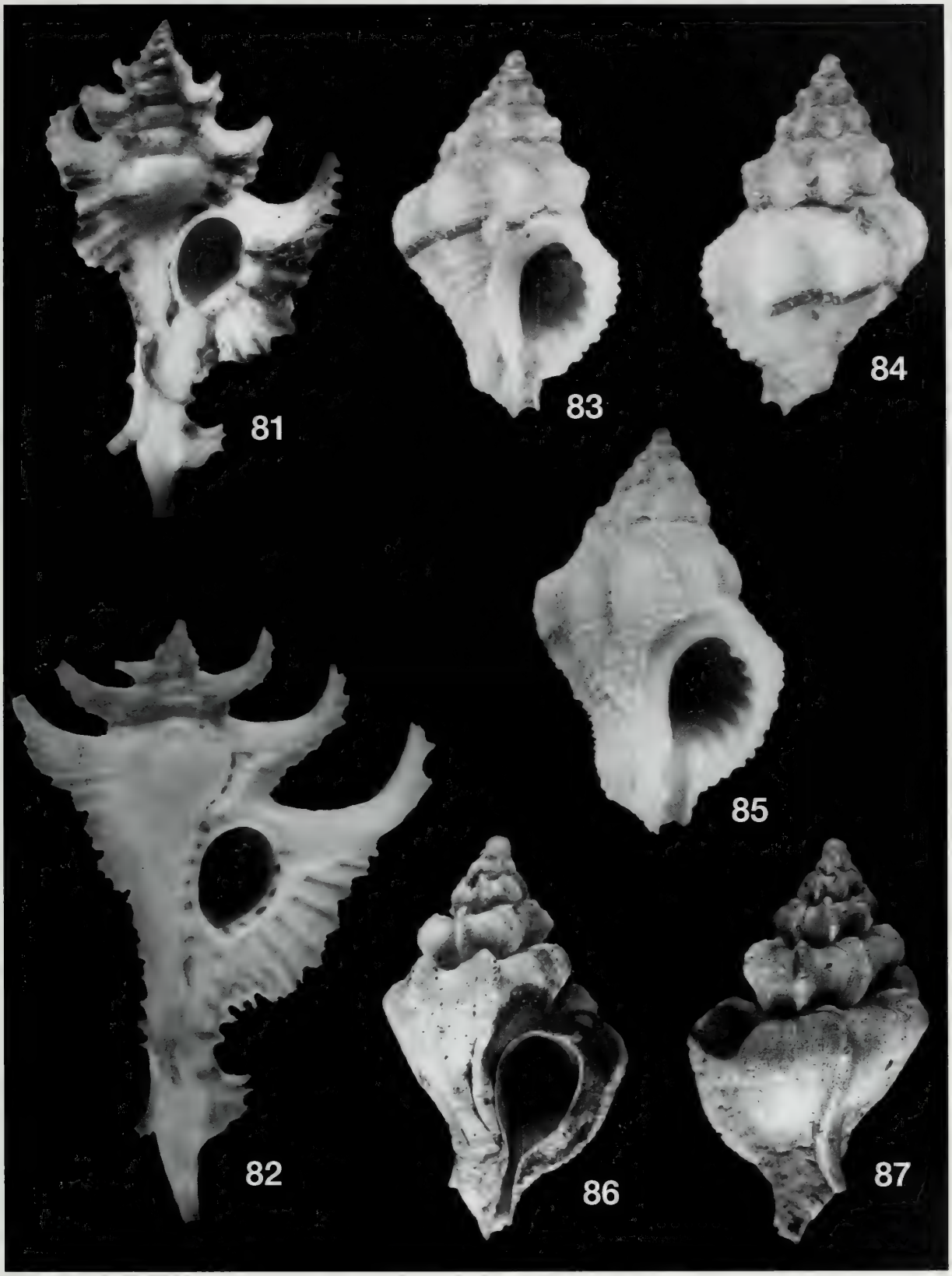
Figures 81-87

81-82. *Purpurellus gambiensis* (Reeve, 1845)
81. Gambie, RH, 58,4 mm
82. Dakar, Sénégal, RH, 73,1 mm

83-85. *Attiliosa goreensis* Houart, 1993
83-84. Holotype, Gorée, Sénégal, MNHN, 14,2 mm
85. Paratype, Gorée, Sénégal, MNHN, 15,9 mm

86-87. *Dermomurex sepositus* Houart, 1993, holotype MNHN, 9 mm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Figures 88-94 (radulas)
(échelles: figs 88-93 = 10 µm; fig. 94 = 50 µm)

88. *Muricopsis (Risomurex) rutilus mariangelae* Rolán & Fernandes, 1991, São Tomé

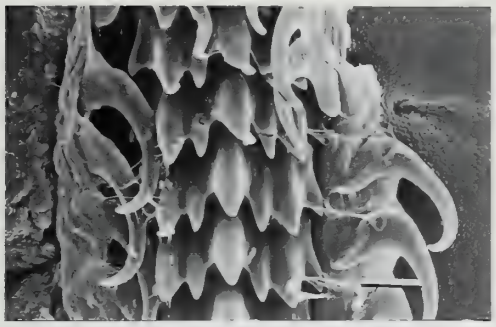
89. *Muricopsis (Risomurex) fusiformis punctata* Houart, 1990, Moçamedes, Angola

90. *Muricopsis (Risomurex) matildae* Rolán & Fernandes, 1991, photo E. Rolán

91. *Pradoxa confirmata* Fernandes & Rolán, 1989, São Tomé

92-93. *Pradoxa thomensis* Fernandes & Rolán, 1989, São Tomé

94. *Murexiella bojadorensis* (Locard, 1897), Ghana



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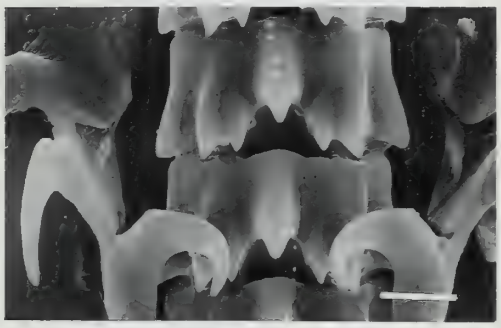

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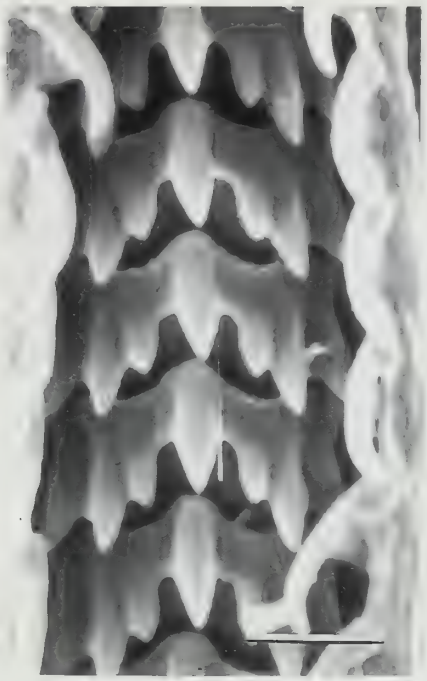

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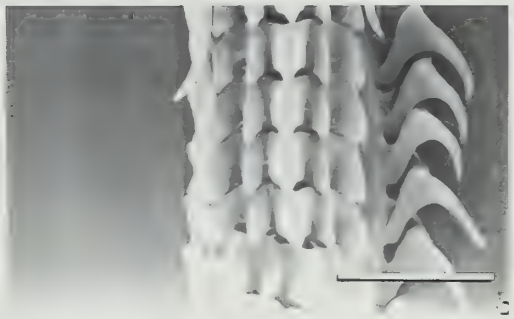

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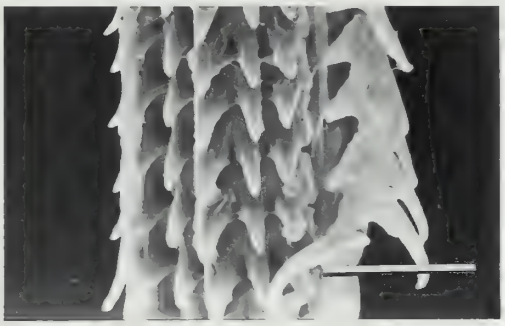

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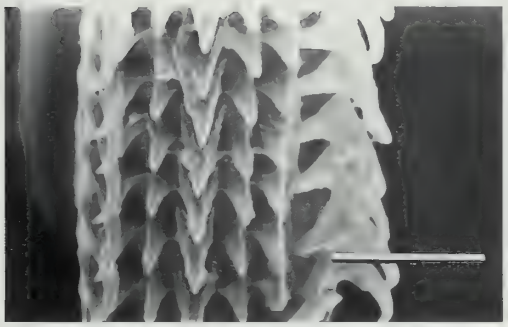

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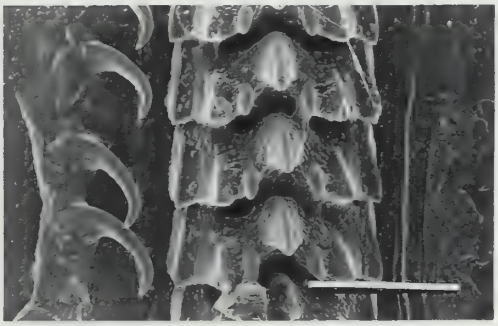

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Figures 95-105 (radulas et protoconques)
(échelles: figs 95 = 50 µm; 96 = 20 µm; 97-105: 0,5 mm)

95-96. *Favartia burnayi* Houart, 1981, Cap Vert

97-98. *Muricopsis (Risomurex) fusiformis fusiformis* (Gmelin, 1791)

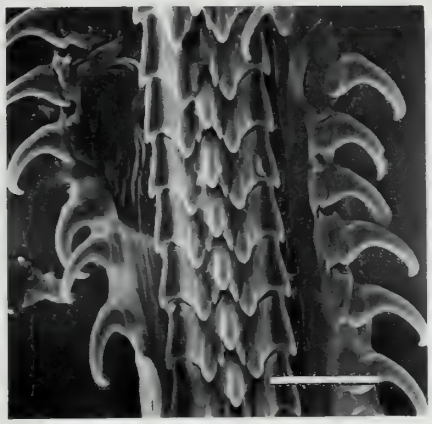
99. *Muricopsis (Risomurex) rutilus rutilus* (Reeve, 1846)

100-101. *Muricopsis (Risomurex) fusiformis punctata* Houart, 1990

102. *Muricopsis (Risomurex) seminolensis* Vokes & Houart, 1986

103. *Muricopsis (Risomurex) suga suga* (Fischer-Piette, 1942)

104-105. *Muricopsis (Risomurex) suga discissus* Houart, 1990



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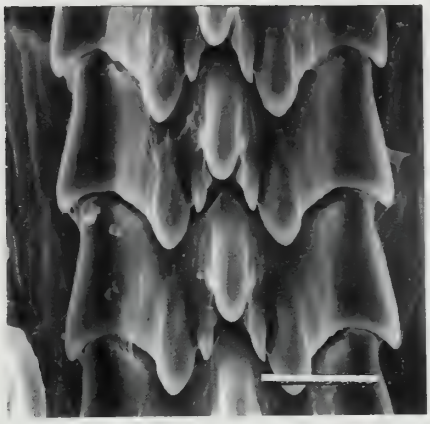

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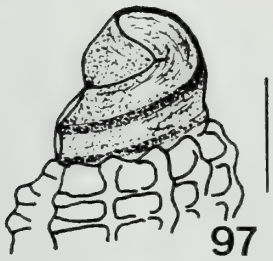

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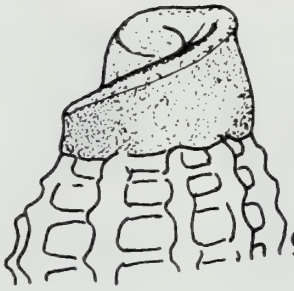

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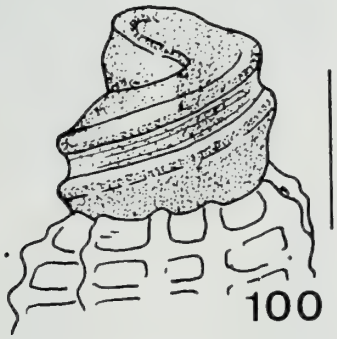

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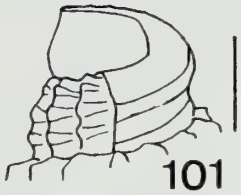

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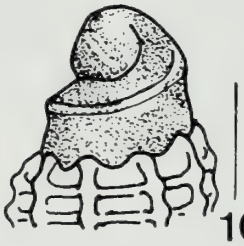

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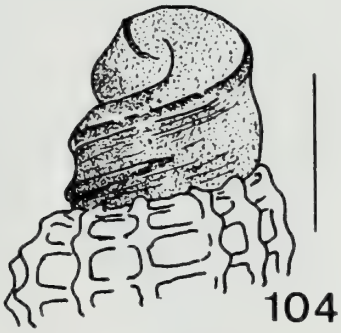

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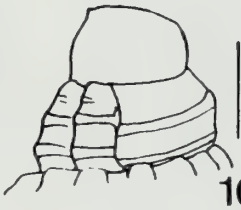


105

Figures 106-120 (protoconques, coquilles, opercules)
(échelles: figs 106-111 = 0,5 mm; 119-120 = 100 µm)

106. *Muricopsis (Risomurex) rutilus mariangelae* Rolán & Fernandes, 1991

107. *Muricopsis (Risomurex) gofasi* Houart, 1993

108. *Subpterynotus exquisitus* (Sowerby, 1904)

109. *Favartia burnayi* Houart, 1981

110. *Favartia emersoni* Radwin & D'Attilio, 1976

111. *Murexiella bojadorensis* (Locard, 1897)

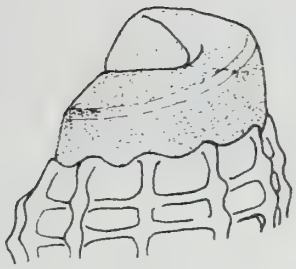
112-113. *Muricopsis (Risomurex) suga suga* (Fischer-Piette, 1942), Dakar, Sénégal. 112: 11,3 mm; 113: 10,4 mm

114-116. *Muricopsis (Risomurex) suga discissus* Houart, 1990
114-115. Benguela, Angola, holotype MNHN, 11 mm
116. Benguela, Angola, RH, 11 mm

117-118. *Muricopsis (Risomurex) rutilus mariangelae* Rolán & Fernandes, 1991, São Tomé, MNHN, 12 mm

119. Opercule de *Pradoxa confirmata* Fernandes & Rolán, 1989

120. Opercule de *Pradoxa thomensis* Fernandes & Rolán, 1989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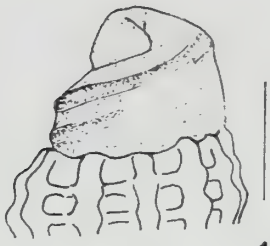
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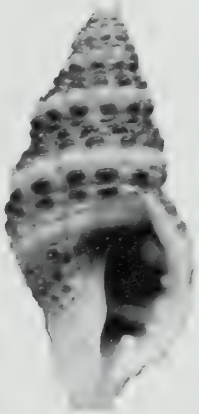
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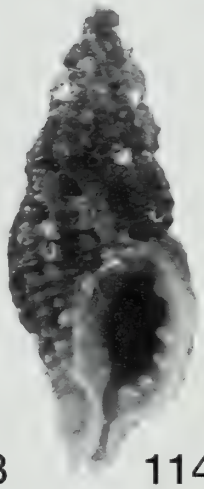
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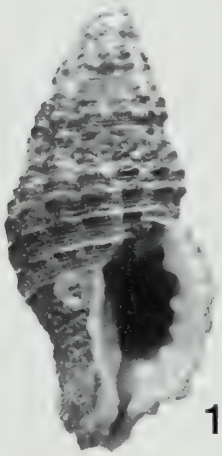
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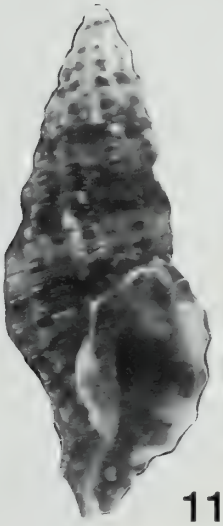
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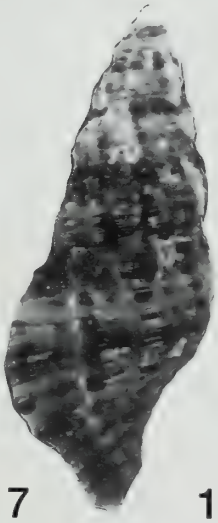
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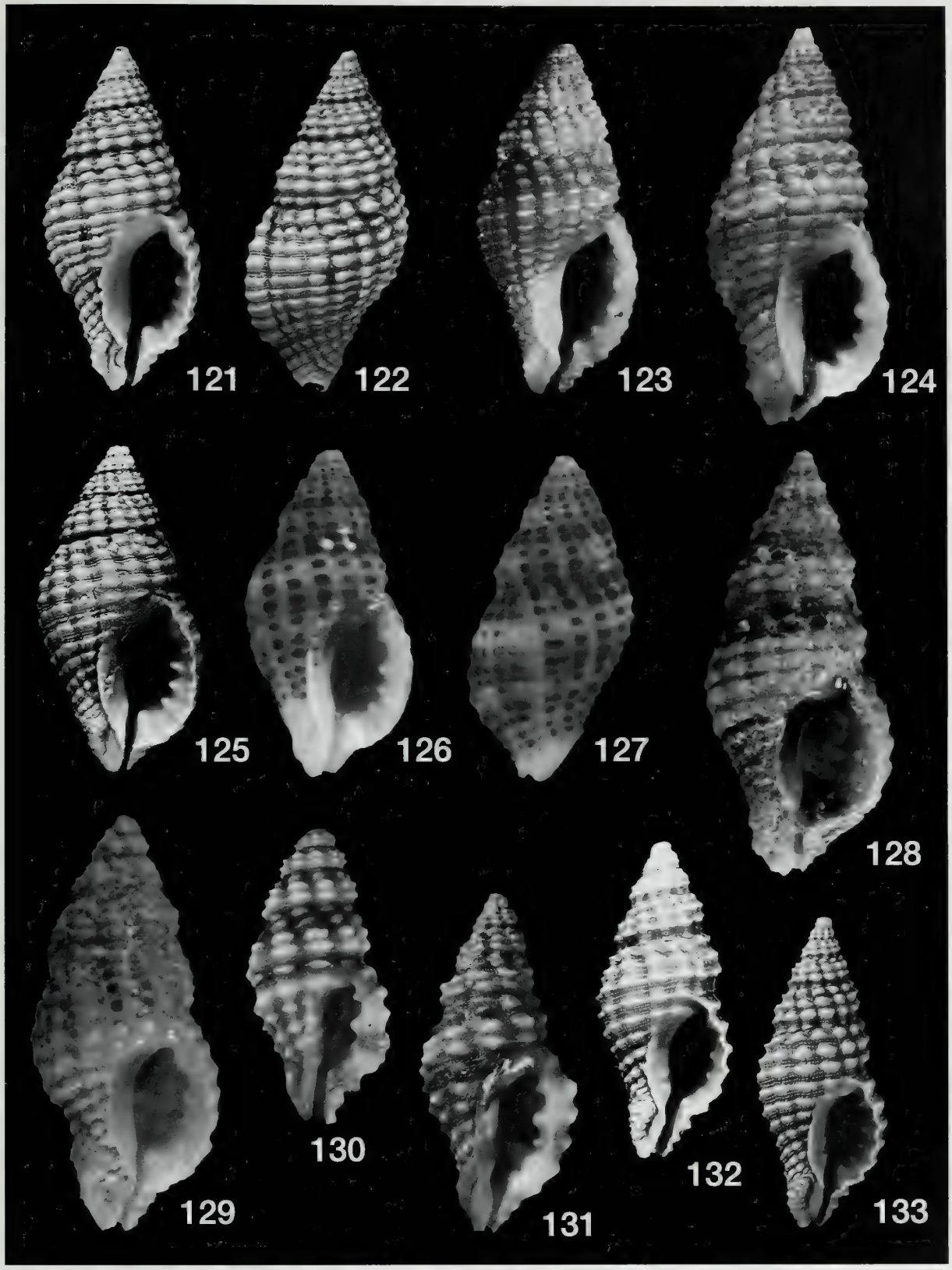
Figures 121-133

121-124. *Muricopsis (Risomurex) fusiformis fusiformis* (Gmelin, 1791)
121-122. Sénégal, lectotype MNHN, 13,5 mm, photo E.H. Vokes
123. Gorée, Sénégal, lectotype de *Cantharus multigranosus* von Maltzan, 1884, ZMB 37204, 14,4 mm
124. Dakar, Sénégal, RH, 15,1 mm

125-129. *Muricopsis (Risomurex) fusiformis punctata* Houart, 1990
125-127. Moçamedes, Angola, holotype MNHN, 12 mm (125: photo P. Lozouet)
128. Lucira Bay, Angola, RH, 11,5 mm
129. Lucira Bay, Angola, RH, 11,4 mm

130-131. *Muricopsis (Risomurex) rutilus rutilus* (Reeve, 1846)
130. Lectotype BMNH 1968461, 12 mm, photo E.H. Vokes
131. Ghana, RH, 13 mm

132-133. *Muricopsis (Risomurex) suga suga* (Fischer-Piette, 1942)
132. Gorée, Sénégal, lectotype MNHN, 10 mm, photo E.H. Vokes
133. Sénégal, USNM, 9,9 mm, photo E.H. Vokes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Figures 134-145

134-136. *Muricopsis (Risomurex) rutilus mariangelae* Rolán & Fernandes, 1991
134-135. São Tomé, holotype 15.05/1110, Museo de Ciencias Naturales de Madrid, 10,6 mm, photo E. Rolán
136. São Tomé, paratype coll. E. Rolán, photo E. Rolán

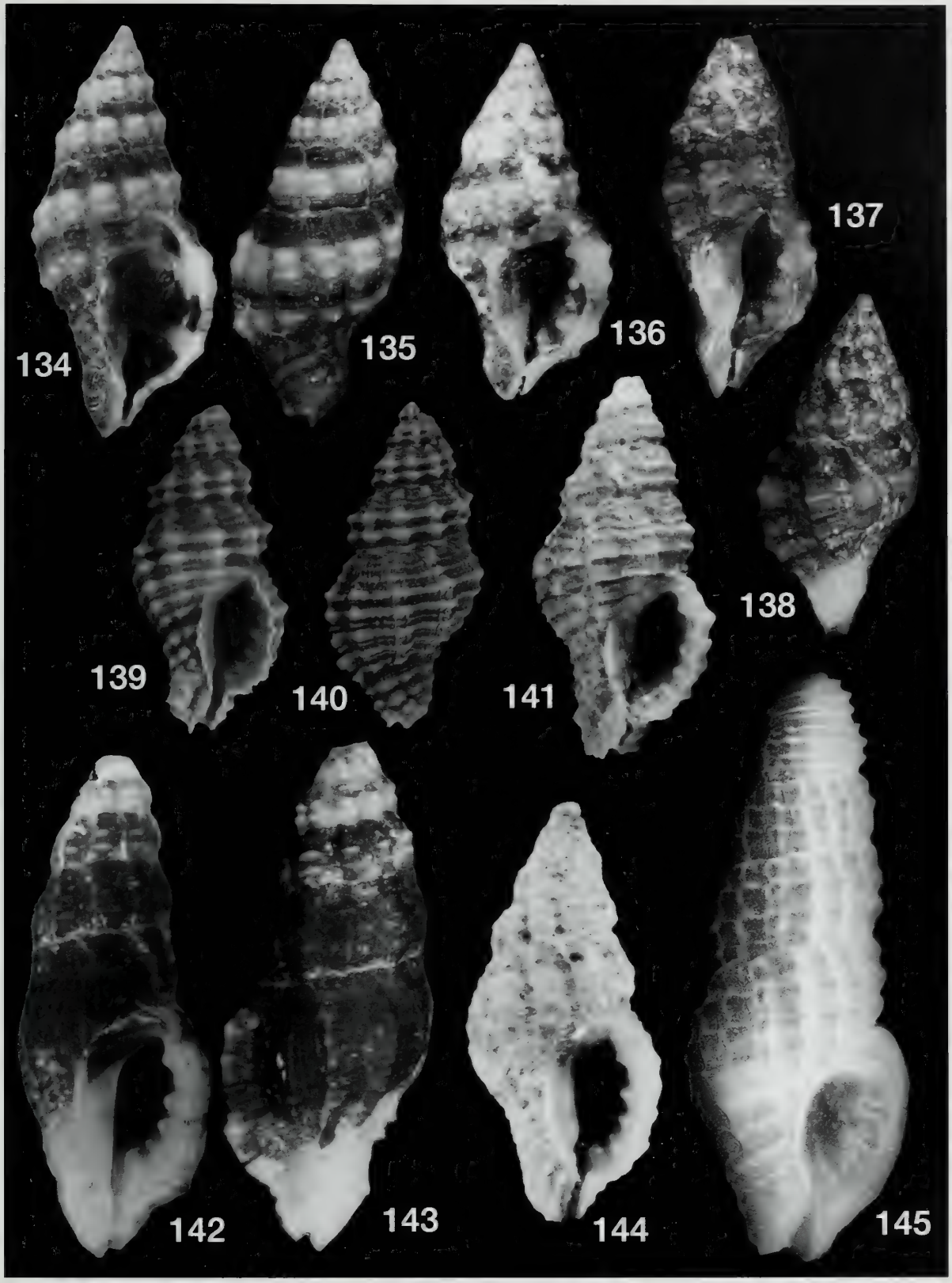
137-138. *Muricopsis (Risomurex) matildae* Rolán & Fernandes, 1991
137. São Tomé, paratype coll. E. Rolán, photo E. Rolán
138. São Tomé, holotype 15.05/1111, Museo de Ciencias Naturales de Madrid, 9,1 mm, photo E. Rolán

139-141. *Muricopsis (Risomurex) seminolensis* Vokes & Houart, 1986
139-140. Dakar, Sénégal, holotype MNHN, 8,5 mm, photo E.H. Vokes
141. Gorée, Sénégal, RH, 9,9 mm

142-143. *Muricopsis (Risomurex) principensis* Rolán & Fernandes, 1991, Principe, holotype 15.05/1112, Museo de Ciencias Naturales de Madrid, 13 mm, photo E. Rolán

144. *Muricopsis (Risomurex) gofasi* Houart, 1993, Namibe, Angola, holotype MNHN, 13 mm

145. *Pradoxa confirmata* Fernandes & Rolán, 1989, São Tomé, holotype 15.05/1042, Museo de Ciencias Naturales de Madrid, 4,3 mm, photo E. Rolán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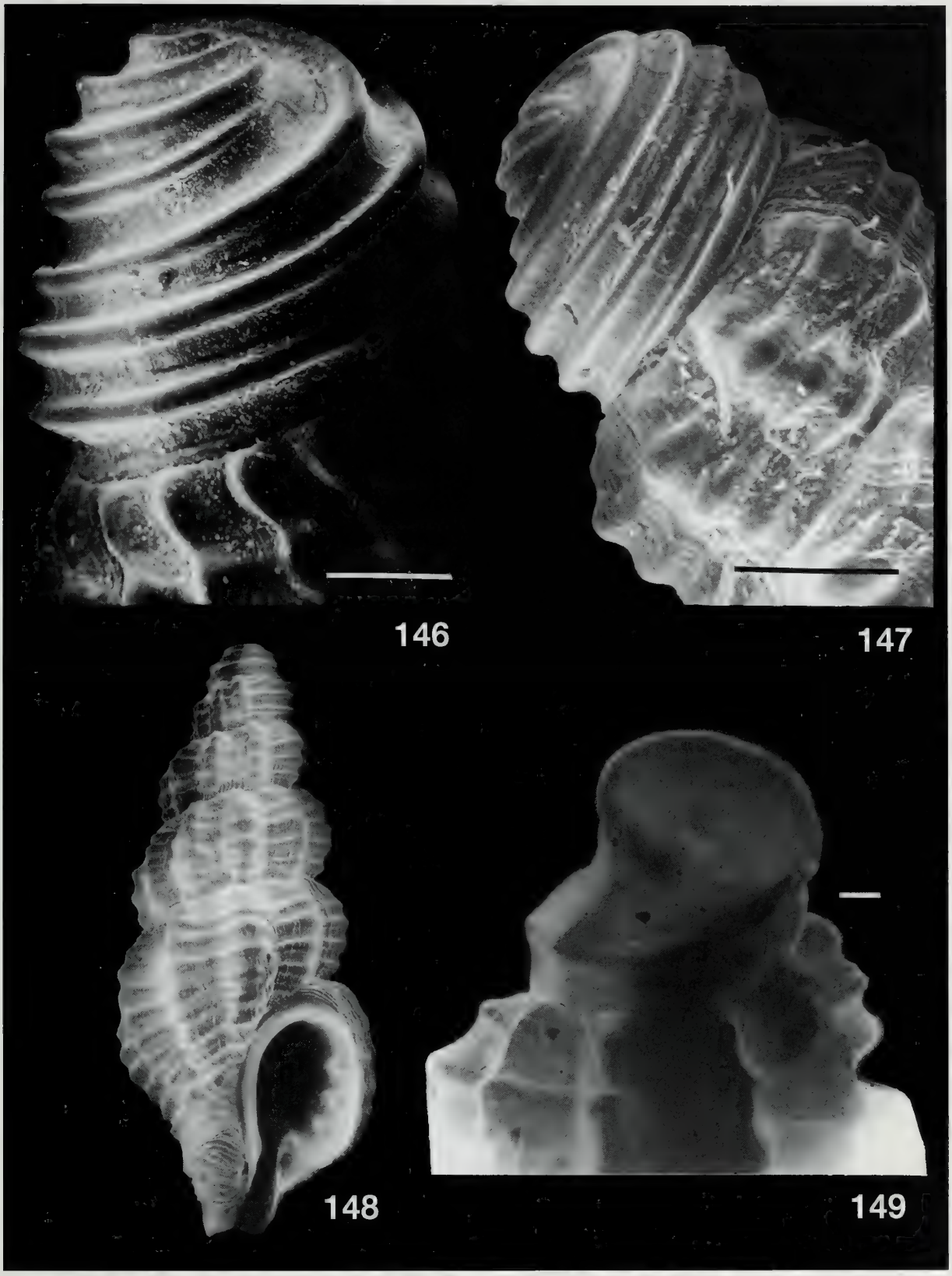
Figures 146-149

146. Protoconque de *Pradoxa confirmata* Fernandes & Rolán, 1989 (échelle: 0,25 mm), photo E. Rolán

147. Protoconque de *Pradoxa thomensis* Fernandes & Rolán, 1989 (échelle: 0,25 mm), photo E. Rolán

148. *Pradoxa thomensis* Fernandes & Rolán, 1989, São Tomé, holotype 15.05/1042, Museo de Ciencias Naturales de Madrid, 3,4 mm, photo E. Rolán

149. Protoconque de *Muricopsis (Risomurex) principensis* Rolán & Fernandes, 1991 (échelle: 0,2 mm), photo E. Rolán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Figures 150-153 (échelles: 150 & 152 = 0,2 mm; 151-153 = 0,1 mm)

150-151. *Muricopsis (Risomurex) matildae* Rolán & Fernandes, 1991 (photo E. Rolán)
150. Protoconque
151. Détail de la microsculpture de la protoconque

152-153. *Muricopsis (Risomurex) rutilus mariangelae* Rolán & Fernandes, 1991 (photo E. Rolán)
152. Protoconque
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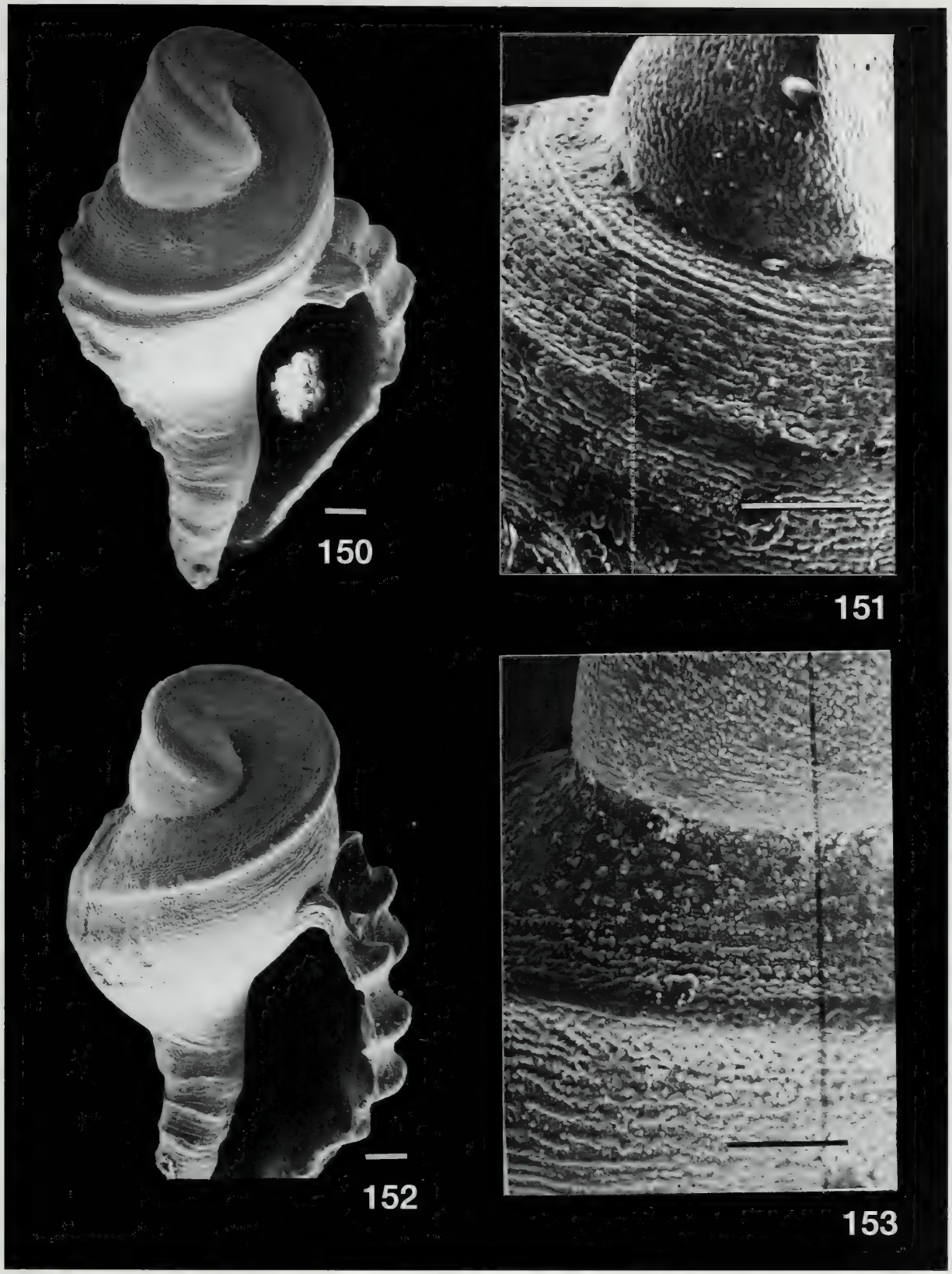
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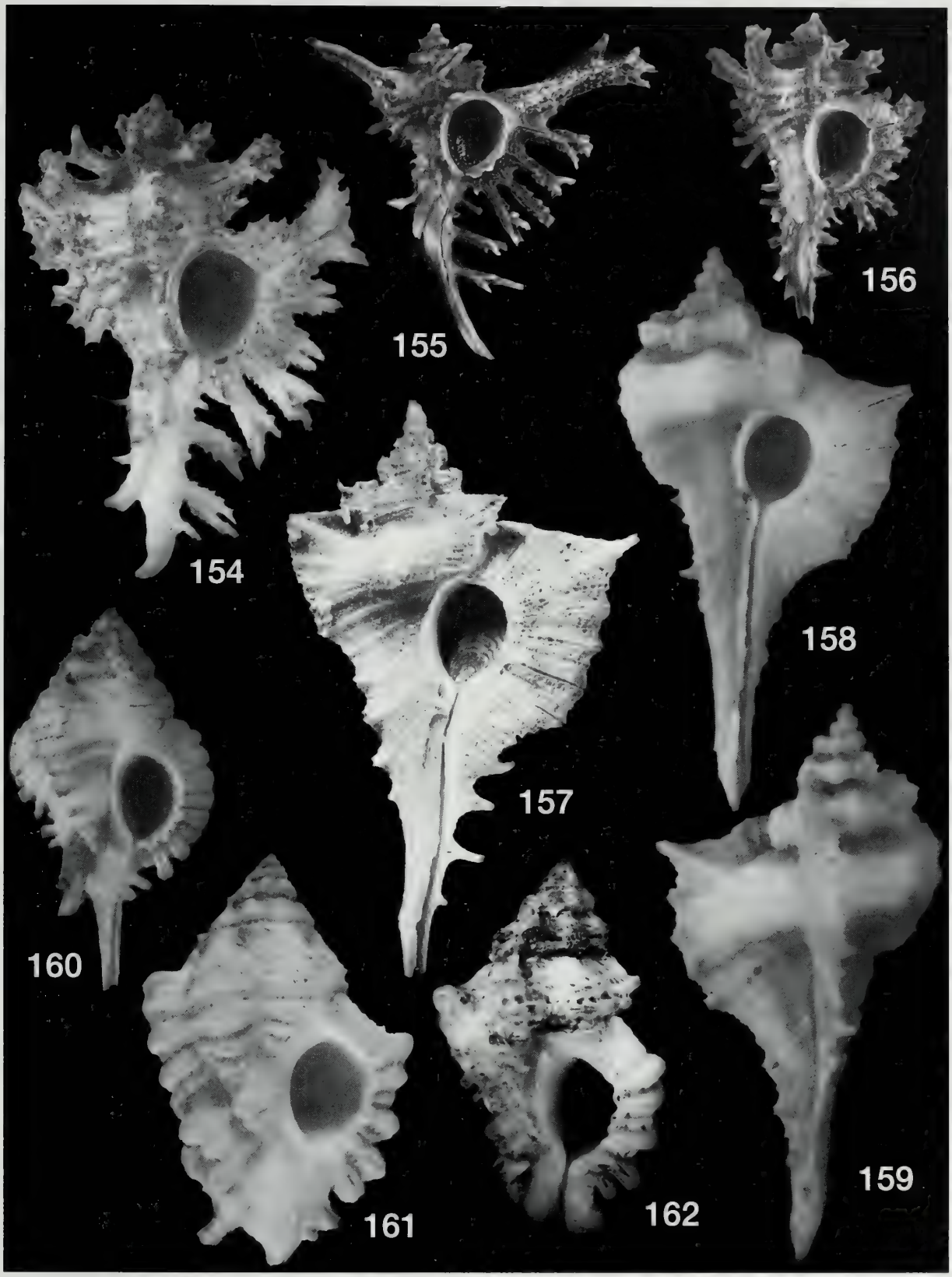
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Type specimens *vs.* figures: on the identity of some *Oliva* species [1]

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ABSTRACT. Examples of taxonomic errors resulting from faulty interpretation of old figures are reported. *Oliva caldania* Duclos, 1835 is here considered to be a nomen dubium. *O. brettinghami* Bridgman, 1909, *O. emeliodina* Duclos, 1845, *O. jaspidea* Duclos, 1835, *O. nitidula* Duclos, 1835 and *O. picta* Reeve, 1850 are here considered to be valid names. Problems of synonymy are discussed.

RESUME. Des exemples d'erreurs taxonomiques provenant de l'interprétation erronée d'anciennes illustrations sont donnés. *Oliva caldania* Duclos, 1835 est ici considérée être un nomen dubium. *O. brettinghami* Bridgman, 1909, *O. emeliodina* Duclos, 1845, *O. jaspidea* Duclos, 1835, *O. nitidula* Duclos, 1835 and *O. picta* Reeve, 1850 sont ici considérées être des noms valides. Les problèmes de synonymie sont discutés.

KEYWORDS. Mollusca, Gastropoda, Olividae, *Oliva*, systematics, synonymy, *brettinghami*, *caldania*, *emeliodina*, *jaspidea*, *nitidula*, *picta*.

1. INTRODUCTION

1.1. This paper aims at drawing attention to the point that much of the present nomenclatural confusion in the genus *Oliva* stems from the difficulties that are met when comparing specimens with old illustrations.

Only a small number of the existing *Oliva* types have been illustrated, mostly by Kaicher as black-and-white photographs on cards, but this most useful work was published after the last revision (Petuch & Sargent, 1986). No systematic survey of the many existing types has yet been used in a revision of the genus. Few of the authors of monographs on *Oliva* have actually checked the type material. In general (see GREIFENEDER, DUCHAMPS & TURSCH, 1995: 39), *Oliva* species cannot be unambiguously recognised from their original description, so most authors have relied on the original figures.

The genus *Oliva* is so homogeneous that identifications based solely on the interpretation of old figures can sometimes be quite risky. The iconography on *Oliva* is abundant but its quality is highly variable, ranging from totally unrecognisable depictions (in the words of a student: "medieval cartoons") to DUCLOS' superb and generally accurate engravings.

The shells of most *Oliva* species differ mainly by rather subtle differences in shape. This shape can be much distorted when the shell is drawn in an oblique perspective, as it is often the case in old engravings. Interpreting ancient pictorial conventions can also raise problems: shadings can easily be confused with colour markings and *vice versa*. Colour engravings generally convey some idea of the colour pattern, but this is a notoriously variable character for most species in the genus and illustrators appear to have sometimes "embellished" beach-worn specimens (see *O. natalia* Duclos, 1845, herein). Moreover, a drawing emphasises the features that are deemed diagnostical and important by the author, but the taxonomic importance imparted to these characters has changed with the years.

With so many possibilities for errors, it is not surprising that the identity of many *Oliva* species has not been recognised or has been misinterpreted. It will be seen that errors of interpretation did indeed occur, even in the case of high quality illustrations, such as the figures of REEVE and even those of DUCLOS (possibly the best). These are fundamental reference works, so one might assume that they were carefully examined by subsequent authors.

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[2] Research Associate.

Errors of interpretation can be of two types. On the one hand, some *Oliva* species have been rashly matched with ambiguous figures. In the case of *O. caldania* Duclos, 1835, discussed herein, one might question whether subsequent authors even bothered with original descriptions. On the other hand, the identity of many species was not recognised from the original illustrations (examples, discussed here under, are: *O. emeliodina* Duclos, 1845, *O. jaspidea* Duclos, 1835, *O. nitidula* Duclos, 1835 and *O. picta* Reeve, 1850).

Most *Oliva* taxa can be safely identified only by referring to type specimens –when existent– or to clear photographs of the type material. Even in these optimal conditions, identification can be fraught with problems. The type lot is sometimes heterogeneous, including specimens of two or more species. The paucity of type specimens often does not allow the estimation of the range of intraspecific variation. It can also happen that the type is a juvenile specimen, sometimes worn beyond recognition. The case (still unsolved) of *Oliva grata* Marrat, 1871 is an example of such a situation.

1.2. Abbreviations.

AMNH: American Museum of Natural History, New York.
AMS: Australian Museum, Sydney.
BM(NH): The Natural History Museum, London.
MCM: Merseyside County Museum, Liverpool.
MNHN: Muséum National d'Histoire Naturelle, Paris.
MLCF: Musée Lecoq, Clermont-Ferrand.
NMSA: Natal Museum, Pietermaritzburg.
NNML: Nationaal Natuurhistorisch Museum, Leiden.
USNM: National Museum of Natural History (Smithsonian Institution), Washington D.C.
ZMA: Zoölogisch Museum, Amsterdam.

1.3. Conventions.

Throughout this text, the convenient device of a semicolon inserted between the specific name and the author [*X-us albus* ; Smith (not Brown)] is used to distinguish between a misidentification, which has no nomenclatural status, and a homonym [*X-us albus* Smith (not Brown)], which has (see MAYR & ASHLOCK 1991: 362).

The names of frequently cited authors are abbreviated, to save on space. So, B. & B. stands for BURCH & BURCH, P. & S. for PETUCH & SARGENT, W. & A. for WAGNER & ABBOTT, Z. & P. for ZEIGLER & PORRECA.

To avoid confusion, "Pl." and "fig(s)." refer to plates and figures in cited works, while "PL." and "FIG(S)." refer to illustrations in the present paper.

1.4. Methodology.

It is easy to demonstrate that two samples are different. It is theoritically impossible to demonstrate that two samples are identical. The best one can do is to report that the samples could not be distinguished by any of the potential discriminants that were tested. The strength of the argument increases with the number of independant tests. Contrary to general belief, the strength of the argument does not depend on the size of the samples that are being compared. Any overlap in the distribution of characters that is demonstrated on small samples will persist (and probably augment) if the size of the samples is increased. Secure conclusions can therefore be reached even when one of the samples consists of a single specimen (for instance, a unique type specimen).

In this study, all efforts were made to demonstrate that samples bearing different names were indeed different. The criteria used to that end were:

1/ computer-assisted biometric comparison, with over fifty characters considered (for details on shell measurements and examples of analysis methods see TURSCH, MISSA & BOUILLON 1992);

2/ detailed colour pattern analysis (for examples, see TURSCH & GREIFENEDER 1996).

It is only after every one of these tests failed to discriminate the samples that we felt compelled to reverse the initial assumption of non-identity.

2. SYSTEMATICS

Family OLIVIDAE Latreille, 1825
Subfamily OLIVINAE Latreille, 1825
Genus *Oliva* Bruguière, 1789

Oliva caldania Duclos, 1835.

Oliva caldania Duclos, 1835: Pl. 6, figs. 3, 4; 1845: 13, Pl. 7, figs. 3, 4.

Oliva caldania Duclos, 1835 is the name unanimously applied today to a common Australian species. Unfortunately, the identity of *O. caldania* Duclos, 1835 cannot be established anymore. No type material could be traced at the MNHN or in the Duclos

collection at MLCF. The illustrations of Duclos (see PL. 1, FIG. 1) are quite enigmatic. The drawings do not show the sharply defined zigzag pattern of the body whorl, characteristic of the Australian species (in which the series of dark markings on the inner edge of the lip can be observed in juvenile specimens). The row of regularly spaced blotches extending along the columella is certainly a rare feature in the genus. The arched columella is more evocative of *Oliva oliva* (Linné, 1758).

The description of DUCLOS (1845: 13) refers to Pl. 7, figs. 3, 4 (labelled *O. caldania*) and figs. 21, 22 (with the caption *O. razamola*). The description is:

"[o]*rnée sur son dernier tour de petites taches irrégulières de couleur rousse, et portant sur le côté le plus rapproché de la spire une rangée de petits points ovales rouges qui continue sur les deux avants derniers tours de la spire. La bouche est étroite, le bord droit est également ponctué de rouge. . . .*"

The locality is: "*Habite la Californie.*" None of this corresponds to the familiar Australian *O. caldania* ; auct. (not Duclos, 1835), in which the blotches on the spire are not oval but squarish, and not red –at least in live specimens. The markings on the inner lip present in subadult specimens are dark purple-brown, not red.

O. caldania Duclos, 1835 was a synonym of *O. reticularis* Lamarck, 1811 for DUCROS DE SAINT GERMAIN (1857: 55) who, as a director of the Musée Lecocq in Clermont-Ferrand, had access to the Duclos material. Ducros commented:

"Ol. caldania, *Duclos, a été établie avec trois individus jeunes et un peu roulés, chez lesquels les réticulations spirales sont réunies de manière à former de petits points rouges. Le dessin de Duclos est très inexact.*"

Whatever *O. caldania* Duclos, 1835 might be, its open, flaring lip and its heavily accented suprafasciolar band pattern –a row of regularly spaced blotches extending along the columella– warrant that it is *not* the *O. caldania* of later authors (this species has a nearly straight lip and is almost devoid of suprafasciolar ornamentation –a rare feature in *Oliva*). Because both the figures and the description of DUCLOS could apply to dead specimens of several small *Oliva* species, *Oliva caldania* Duclos, 1835 must be considered as a **nomen dubium**.

O. caldania Duclos, 1835 was *O. australis* Duclos, 1835 for B. & B. (1960), a valid name for Z. & P. (1969), W. & A. (1978) and P. & S. (1986).

Oliva brettinghami Bridgman, 1909.

Oliva brettinghami Bridgman, 1909: 203.

Oliva caldania ; auct. (not Duclos, 1835).
Oliva (Proxoliva) caldania queenslandica Petuch & Sargent, 1986: 114, Pl. 19, figs. 5, 6.

Oliva brettinghami Bridgman, 1909. The holotype (H: 18.2 mm; D: 8.3 mm) is at the BM(NH), with six additional paratypes. The locality is "N.W. Australia". The shell (see PL. 1, FIG. 2) is unquestionably the Australian *O. caldania* ; auct. (not Duclos, 1835) [in agreement with the unanimous conclusions of B. & B. (1960), Z. & P. (1969), W. & A. (1978) and P. & S. (1986)]. *O. caldania* Duclos, 1835 being a nomen dubium (see above), *Oliva brettinghami* Bridgman, 1909, the first available name, is **valid**.

Oliva (Proxoliva) caldania queenslandica Petuch & Sargent, 1986. The holotype (H: 12.72 mm; D: 5.82 mm), trawled from 50 m off Cape Moreton, Queensland, by commercial scallop boats, is at AMS C.153539.

Detailed study (see $ 1.4: methodology) of a large series of shells established that the holotype (figured here PL. 1, FIG. 3) is linked by an unbroken chain of intergrades to the usual Western Australian specimens. We are therefore compelled to conclude that *O. caldania queenslandica* Petuch & Sargent, 1986 is a **subjective junior synonym** (at best a local colour form) of *O. brettinghami* Bridgman, 1909.

Oliva emeliodina Duclos, 1845.

Oliva emeliodina Duclos, 1845: 30, Pl. 21, figs. 19, 20.

Oliva sairousa Kilburn, 1980: 221-231.

Oliva emeliodina Duclos, 1845 is represented by six homogeneous syntypes (in two lots) at MNHN [one syntype illustrated by KAICHER (card no. 5541, with the misspelling *emiliodina*)]. The syntype figured by DUCLOS (H: 33.1 mm; D: 15.5 mm), at MNHN (see PL. 1, FIG. 7), matches the description (DUCLOS 1845: 30). The given locality is "*Habite la Cochinchine.*" This is the **valid name** of a Western Indian Ocean species, readily separated from the related species *O. caerulea*

(Röding, 1798). *O. emeliodina* Duclos, 1845 has prominent, characteristic columellar plications; it has dull, brownish colour marks on the body whorl; the spire presents fine, brown strokes which are nearly *radially* orientated. *O. caerulea* (Röding, 1798) has very weak columellar plications (in adult shells); has a characteristic pattern of blue an orange double spots (often very contrasted) on the body whorl; the spire presents strokes which are *tangentially* orientated –as in most *Oliva* species.

This taxon was *O. caerulea* (Röding, 1798) (or its junior synonym *O. episcopalis* Lamarck, 1811, see GREIFENEDER, DUCHAMPS & TURSCH, 1995) for DUCROS de SAINT GERMAIN (1857: 75, with the misspelling "*emelliodina*"), B. & B. (1960), B. & B. (1967), W. & A. (1978), Z. & P. (1969) and for P. & S. [1986 –in which Pl. 9, figs. 27, 28 do indeed depict *O. caerulea* (Röding, 1798)].

Oliva sairousa Kilburn, 1980. The holotype (H: 33.61 mm; D: 16.82 mm), from Bahia das Cocos, Jangamo dist., Mozambique, NMSA 59937/T2279. is figured PL. 1, FIG. 8. Paratype 1, NMSA T 2281, (H: 27.98 mm; D: 12.36 mm), beach at Mossongulo near Massinga. Mozambique, no. 12.1973, has also been examined. Another paratype at the Natal Museum was illustrated by KAICHER, card no. 5499.

Detailed study (see $ 1.4: methodology) of a large series of shells failed to produce any objective criterion by which the type material of *O. sairousa* Kilburn, 1980 could be separated from *O. emeliodina* Duclos, 1845. We are therefore compelled to conclude that *O. sairousa* Kilburn, 1980 is is a **subjective junior synonym** of *O. emeliodina* Duclos, 1845. This opinion is now entirely shared by Dr. KILBURN himself (private communication, 13/5/96).

O. sairousa Kilburn, 1980 –under the misspelling "*sairoosa*"– was a valid name for P. & S. (1986).

Oliva jaspidea Duclos, 1835.

Oliva jaspidea Duclos, 1835: Pl. 6, figs. 9, 10; 1845: 13.

Oliva esiodina Duclos, 1845: 18, Pl. 16 , figs. 19-20.
Oliva duclosi Reeve, 1850: Pl. 19, fig. 44.
Oliva duclosiana Jay, 1850: 367.
Oliva lentiginosa Reeve, 1850: Pl. 19, fig. 45, a, b.

Oliva jaspidea Duclos, 1835 is represented by 5 homogeneous syntypes at MNHN, one of which (H: 19.4 mm; D: 8.2 mm) is here figured PL. 2, FIG. 14. The locality given by Duclos (1845: 13) is "*Habite La Nouvelle Hollande et Otahiti, d'après Mr. Cuming.*"

Detailed study (see $ 1.4: methodology) of a large series of shells failed to produce any objective criterion by which the type material of *O. jaspidea* Duclos, 1835 could be separated from *O. duclosi* Reeve, 1850 [in agreement with the unanimous conclusions of B. & B. (1960), Z. & P. (1969), W. & A. (1978) and P. & S. (1986)]. We are therefore compelled to conclude that *O. jaspidea* Duclos, 1835 is the **valid** name of the shell widely known today as *O. duclosi* Reeve, 1850.

Voluta jaspidea (Gmelin, 1791) (later transferred to the genus *Oliva* by Fischer, 1807) now stands in another genus (*Jaspidella*, in the subfamily Olivellinae, see ABBOTT 1974: 233). So, in application of Article 59c of the Code, *O. jaspidea* Duclos, 1835 is not to be rejected as a secondary junior homonym of *O. jaspidea* (Gmelin, 1791), as erroneously stated by TURSCH & GREIFENEDER (1989a).

Oliva duclosiana Jay, 1850 is represented by two homogeneous specimens in the Jay collection at AMNH. One of these (H: 26.00 mm; D: 12.05 mm), AMNH 89390, no locality, from the Jay collection, is herein figured PL. 2, FIG. 16.

Detailed study (see $ 1.4: methodology) of a large series of shells failed to produce any objective criterion by which the type material of *O. duclosiana* Jay, 1850 could be separated from *O. jaspidea* Duclos, 1835. We are therefore compelled to conclude that *O. duclosiana* Jay, 1850 is a **subjective junior synonym** of *O. jaspidea* Duclos, 1835.

O. duclosiana Jay, 1850 was *O. duclosi* Reeve, 1850 for B. & B. (1960), Z. & P. (1969), W. & A. (1978) and P. & S. (1986).

Oliva esiodina Duclos, 1845 is represented by two light-coloured, somewhat gerontic syntypes at MNHN. The syntype figured by DUCLOS (H: 32.2 mm; D: 14.7 mm, previously illustrated by KAICHER, card no. 5255) is here illustrated PL. 2, FIG. 18. The locality given by Duclos (1845: 19) is "*Habite La Nouvelle Guinée.*"

Detailed study (see $ 1.4: methodology) of a large series of shells failed to produce any objective criterion by which the type material of *O. esiodina* Duclos, 1845 could be

separated from *O. jaspidea* Duclos, 1835. We are therefore compelled to conclude that *O. esiodina* Duclos, 1845 is a **subjective junior synonym** of *O. jaspidea* Duclos, 1835.

O. esiodina Duclos, 1845 was a valid name for TURSCH & GREIFENEDER (1989a), *O. duclosi* Reeve, 1850 for B. & B. (1960), B. & B. (1967), Z. & P. (1969) and W. & A. (1978). It was a valid name for P. & S. (1986) but *O. esiodina* ; Petuch & Sargent (not Duclos, 1845), 1986, figured Pl. 1, figs. 15, 16 is *O. chrysoplecta* Tursch & Greifeneder, 1989.

Oliva duclosi Reeve, 1850 is represented by three homogeneous syntypes in BM(NH) 1987006. One syntype (H: 28.9 mm; D: 13.3 mm), previously illustrated by KAICHER (card no. 5241), is illustrated PL. 2, FIG. 15. The original label reads: "H. CUMING colln. Philippine Islands (Isle of Luzon) + Society Islands". This taxon has been demonstrated (TURSCH & GREIFENEDER (1989a) to be a subjective junior synonym of *O. esiodina* Duclos, 1845. It thus becomes a **subjective junior synonym** of *O. jaspidea* Duclos, 1835.

O. duclosi Reeve, 1850 was a valid name for Z. & P. (1969), W. & A. (1978), and P. & S. (1986).

Oliva lentiginosa Reeve, 1850 is represented by two homogeneous syntypes from the STEERE collection, no locality given, in BM(NH) 1892.2.24.2-4. One syntype has been previously illustrated by KAICHER (card no. 5175). The other syntype (H: 30.3 mm; D: 13.4 mm) is illustrated here PL. 2, FIGS. 17. This has been shown (TURSCH & GREIFENEDER (1989a) to be a subjective junior synonym (colour form) of *O. esiodina* Duclos, 1845. It thus becomes a **subjective junior synonym** of *O. jaspidea* Duclos, 1835.

O. lentiginosa Reeve, 1850 was *O. duclosi* Reeve, 1850 for B. & B. (1960), B. & B. (1967), Z. & P. (1969) and W. & A. (1978). It was a valid name for P. & S. (1986), but *O. lentiginosa* ; Petuch & Sargent (not Reeve, 1850), 1986, figured Pl. 1, figs. 7, 8, is another species, most probably *O. panniculata* Duclos, 1835.

The following names have been mistakenly or questionably considered as synonyms:

Oliva natalia Duclos, 1845: 23 (Pl. 21, figs. 17-18) was considered to be *O. duclosi* Reeve, 1850 by B. & B. (1960), B. & B. (1967), Z. & P. (1969) and W. & A. (1978). This probably stems from the comments of DUCROS DE SAINT GERMAIN (1857: 59):

"Ol. natalia, *Duclos, est une* Ol. duclosi type, *qui a été roulée et décolorée. La figure qu'il en donne a été grandie, rougie et embellie à plaisir.*"

It was a valid name for P. & S. (1986), but *O. natalia* ; Petuch & Sargent (not Duclos, 1845), 1986, figured Pl. 2, figs. 11, 12, is another species, most probably *O. panniculata* Duclos, 1835.

The identity of *O. natalia* Duclos, 1845 cannot be established anymore. No type material could be traced at the MNHN or in the Duclos collection at MLCF. The illustrations of DUCLOS (1845: Pl. 21, figs. 17-18) are very ambiguous. The description of DUCLOS (1845: 23):

"*Petite coquille légèrement anguleuse dans le haut de son dernier tour, entièrement teinte de couleur rouille, surchargée d'une multitude de petites taches blanches trigones. Spire courte, composée seulement de trois tours; ouverture étroite; bord columellaire en totalité plissé d'une manière uniforme et de plis fort gros au nombre de onze. Longueur, 20 millimètres. Habite la Chine. Rarissime.*"

is equally enigmatic. It is certainly safer to consider *O. natalia* Duclos, 1845 as a **nomen dubium**.

Oliva grata Marrat, 1871 is represented by a small, reddish, beach-worn holotype (H: 24.3 mm, D: 10.8 mm) at MCM, previously illustrated by KAICHER (card no. 5567).

This enigmatic shell (without any locality data) has caused much confusion. It was *O. ?caroliniana* Duclos, 1835 for SOWERBY (in MARRAT, 1871: 41); *O. stainforthii* (misspelling for *stainforthi*) Reeve, 1850 for TOMLIN (in FORD 1953: 445); *O. lentiginosa* Reeve, 1850 for B. & B. (1960) and W. & A. (1978). It was a colour form of *O. sidelia* Duclos, 1840 for P. & S. (1986), but *O. sidelia* ; Petuch & Sargent (not Duclos, 1840), 1986, of which the "colour form *grata*" is figured (*Atlas* Pl. 8, figs. 33, 34), is another species, most probably *O. carneola* (Gmelin, 1791) var. *adspersa* Dautzenberg, 1927.

The identity of *O. grata* Marrat, 1871 is not yet clear to us but, whatever it might be, it is certainly not *O. jaspidea* Duclos, 1835.

Oliva stainforthi Reeve, 1850 was considered to be *O. duclosi* Reeve, 1850 by Z. & P. (1969) and P. & S. (1986), *O. lentiginosa* Reeve, 1850 by W. & A. (1978). The identity of *O.*

stainforthi Reeve, 1850 has now been established: it is a subjective junior synonym of *O atalina* Duclos, 1835 (see TURSCH & GREIFENEDER 1996).

Oliva nitidula Duclos, 1835.

Oliva nitidula Duclos, 1835: Pl. 10, figs. 3-4; 1845: 13, Pl. 11, figs. 3, 4.

Oliva paxillus Reeve, 1850: Pl. 21, sp. a-b,
Oliva sandwicensis Pease, 1860: 145.
Oliva thomasi Crosse, 1861: 173, Pl. 6, figs. 3-4.
Oliva (Omogymna) leonardi Petuch & Sargent, 1986: 110, Pl. 39, figs. 11, 12.

Oliva nitidula Duclos, 1835 is represented by 22 syntypes, in six lots, at MNHN. Five of these lots bear a later label of DUCROS DE SAINT GERMAIN: "*Oliva reticularis*". One lot, with a label "*Oliva ozodona*" (also of DUCROS DE SAINT GERMAIN), no locality given, contains four homogeneous syntypes of *O. nitidula*, all presenting the callus step typical of the proposed subgenus *Omogymna* von Martens, 1897 (for details on the structure of this feature, see TURSCH & MACHBAETE 1995). One syntype has been illustrated by KAICHER (card no. 5477). The specimen figured by DUCLOS (H: 19 mm; D: 11 mm) is illustrated here PL. 2, FIG. 9. The locality given by DUCLOS (1845: 13) is "*Habite La Nouvelle Hollande*."

O. nitidula (Dillwyn, 1817) now stands in another genus (it is *Olivella minuta* Link, 1807, see W & A. 1978). Likewise, the fossil *O. nitidula* Deshayes, 1835 (from the Paris region) is also not in the genus *Oliva*. Its redescription in DESHAYES & MILNE EDWARDS (1844: 637) idicates that it is most probably an Ancillid. So, in application of Article 59 c of the Code, *O. nitidula* Duclos, 1835 is not to be rejected as a secondary junior homonym of *O. nitidula* (Dillwyn, 1817) or of *O. nitidula* Deshayes, 1835.

Detailed study (see $ 1.4: methodology) of a large series of shells failed to produce any objective criterion by which the type material of *O. nitidula* Duclos, 1835 could be separated from *O. paxillus* Reeve, 1850. We are thus compelled to conclude that *O. nitidula* Duclos, 1835 is the **valid** name of the shell widely known today as *O. paxillus* Reeve, 1850 [as previously suggested by W. & A. (1978) and by KAICHER (1989)].

O. nitidula Duclos, 1835 was a valid name for P. & S. (1986) –but *O. nitidula* ; Petuch & Sargent (not Duclos, 1835), 1986, figured Pl. 2, figs. 9, 10, is another species, *O. panniculata* Duclos, 1835. *O. nitidula* is a very widespread species, quite variable in shape, in colour, and especially in the shape and the position of the characteristic line marking a discontinuity in the enamel on the body whorl.

Oliva paxillus Reeve, 1850 is represented by 1+2 homogeneous specimens at BM(NH), one with the label: "Holotype H. CUMING colln. Loc.:? "Mauritius" added to the board later - two non-type specimens removed to general collection. ". The type (H: 27.2 mm; D: 12.2 mm) is figured here on PL. 2, FIG. 10. This is here considered to be a **subjective junior synonym** of *O. nitidula* Duclos, 1835, from which it could not be separated in any way (see above, under *O. nitidula*).

O. paxillus Reeve, 1850 was a valid name for Z. & P. (1969), W. & A. (1978) and P. & S. (1986).

Oliva sandwicensis Pease, 1860 is represented by a lectotype [BM(NH) 1961188] and a paralectotype [BM(NH) 1961189], selected by KAY (1965). The label states: "H. CUMING colln: Sandwich Islands ....". The lectotype (H: 27.2 mm; D: 13.0 mm) is here figured PL. 2, FIG. 11.

Detailed study (see $ 1.4: methodology) of a large series of shells failed to produce any objective criterion by which the type material of *O. sandwicensis* Pease, 1860 could be separated from *O. nitidula* Duclos, 1835. We are therefore compelled to conclude that *O. sandwicensis* Pease, 1860 is a **subjective junior synonym** (at best a local form) of *O. nitidula* Duclos, 1835.

O. sandwicensis Pease, 1860 –under the misspelling "*sandwichensis*"– was a valid name for P. & S. (1986). It was *O. paxillus* Reeve, 1850 for W. & A. (1978) as for (under the misspelling "*sandwichiensis*") B. & B. (1960) and Z. & P. (1969).

Oliva thomasi Crosse, 1861 is represented by the holotype (H: 26.8 mm; D:11.4 mm) at BM(NH), here figured PL. 2, FIG. 13, locality "*Habitat in insula Taïti dicta*."

Detailed study (see $ 1.4: methodology) of a large series of shells failed to produce any objective criterion by which the type of *O. thomasi* Crosse, 1861 could be separated from *O. nitidula* Duclos, 1835. We are therefore compelled to conclude that *O. thomasi* Crosse, 1861 is a **subjective junior synonym** of *O. nitidula* Duclos, 1835.

This was *O. paxillus* Reeve, 1850 for B. & B. (1960), Z. & P. (1969), W. & A. (1978) and P. & S. (1986).

Oliva (Omogymna) leonardi Petuch & Sargent, 1986 is represented by the holotype (H: 12.90 mm; D: 5.51 mm) USNM 841461 , caught in 30 m off Durban, South Africa, here figured PL. 2, FIG. 12. This is a dead, very discoloured specimen.

Detailed study (see $ 1.4: methodology) of a large series of shells failed to produce any objective criterion by which the type of *O. leonardi* Petuch & Sargent, 1986 could be separated from *O. nitidula* Duclos, 1835. We are thus compelled to conclude that *O. leonardi* Petuch & Sargent, 1986 is a **subjective junior synonym** of *O. nitidula* Duclos, 1835. The position at mid-body of the enamel discontinuity line, claimed to be characteristic of this taxon, is in fact very variable. Examination of many specimens from the type locality, including shells with a very normal, oblique "*Omogymna* line", establishes that the position and shape discontinuity line are highly variable.

Oliva picta Reeve, 1850.

Oliva picta Reeve, 1850: Pl. 26, fig. 79.

Oliva ceramensis Schepman, 1904: 68-69.

Oliva (Galeola) insecta Petuch & Sargent, 1986: 84, Pl. 8, figs. 27-30.

Oliva picta Reeve, 1850 is represented by 3 homogeneous syntypes at BM(NH), one of which was illustrated by KAICHER (card no. 5227). The label bears: "Philippine Islands, H. CUMING colln." One syntype (H: 15.6 mm; D: 8.4 mm) is figured here on PL. 1, FIG. 4.

Detailed study (see $ 1.4: methodology) of a large series of shells failed to produce any objective criterion by which the type material of *O. picta* Reeve, 1850 could be separated from *O. ceramensis* Schepman, 1904 [as previously suggested by KAICHER (1989)]. We are thus compelled to conclude that *O. picta* Reeve, 1850 is the **valid** name of the shell widely known today as *O. ceramensis* Schepman, 1904.

O. picta Reeve, 1850 was *O. dactyliola* Duclos, 1835 for B. & B. (1960) and W. & A. (1978). It was a valid name for P. & S. (1986), but *O. picta* ; Petuch & Sargent (not Reeve, 1850), 1986, figured Pl. 7, figs. 5, 6, is another species, most probably *O. dactyliola* Duclos, 1835.

Oliva ceramensis Schepman, 1904 is represented at ZMA by one fresh syntype (the label says: "1 Lectotype from Ceram, Waru Bay, Sta. 174", but the designation of a lectotype was apparently never published) and two worn syntypes, from deep water off Ceram Island, Indonesia. The syntype (H: 14.2 mm; D: 7.8 mm) ZMA 3.11.104, is figured here on PL. 1, FIG. 5. Another syntype is at NNML.

We are compelled to conclude that *O. ceramensis* Schepman 1904 is a **subjective junior synonym** of *O. picta* Reeve, 1850 because detailed study of a large series (see above under *O. picta*) failed to produce any criterion by which the two taxa could be separated.

O. ceramensis Schepman 1904 was a valid name for Z. & P. (1969), W. & A. (1978) and P. & S. (1986), and was *O. carneola* (Gmelin, 1791) for B. & B. (1960) (under the misspelling "*ceramansis*").

Oliva (Galeola) insecta Petuch & Sargent, 1986 is represented by the holotype (H: 12.32 mm; D: 6.57 mm), trawled in 100 m, Davao Bay, Mindanao, Philippines, USNM 841437, illustrated PL. 1, FIG. 6. This is a dead shell, still filled with black and white fine sand and bearing on the spire a scar made by a drilling predator (possibly a *Naticidae*).

This specimen could not be separated (see $ 1.4: methodology) from large samples of *Oliva picta* Reeve, 1850 (from the North Coast of Papua New Guinea, not distinguishable from the type) except for details in the arrangement of colour spots of the body whorl. In the genus *Oliva*, such differences are fully expected to be found between conspecific populations (VAN OSSELAER et al. 1993, TURSCH 1994, TURSCH 1995) and do not constitute interspecific discriminants. We are therefore compelled to conclude that *O. insecta* Petuch & Sargent, 1986 is a **subjective junior synonym** (at best a local colour form) of *Oliva picta* Reeve, 1850.

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INDEX TO NAMES (valid taxa in **bold**).

O. brettinghami Bridgman, 1909: valid.
O. caldania Duclos, 1835: nomen dubium
O. caldania queenslandica Petuch & Sargent, 1986: subjective junior synonym of *O. brettinghami* Bridgman, 1909.
O. ceramansis Schepman (auct.): misspelling for *O. ceramensis* Schepman 1904.
O. ceramensis Schepman 1904: subjective junior synonym of *O. picta* Reeve, 1850.
O. duclosi Reeve, 1850: subjective junior synonym of *O. jaspidea* Duclos, 1835.
O. duclosiana Jay, 1850: subjective junior synonym of *O. jaspidea* Duclos, 1835.
O. emeliodina Duclos, 1845: valid.
O. emelliodina Duclos (auct.): misspelling for *O. emeliodina* Duclos, 1845.
O. emiliodina Duclos (auct.): misspelling for *O. emeliodina* Duclos, 1845.
O. esiodina Duclos, 1845: subjective junior synonym of *O. jaspidea* Duclos, 1835.
O. grata Marrat, 1871: identity not yet established.
O. insecta Petuch & Sargent, 1986: subjective junior synonym of *O. picta* Reeve, 1850.
O. jaspidea Duclos, 1835: valid.
O. lentiginosa Reeve, 1850: subjective junior synonym of *O. jaspidea* Duclos, 1835.
O. leonardi Petuch & Sargent, 1986: subjective junior synonym of *O. nitidula* Duclos, 1835.
O. natalia Duclos, 1845: nomen dubium.
O. nitidula Duclos, 1835: valid.
O. paxillus Reeve, 1850: subjective junior synonym of *O. nitidula* Duclos, 1835.
O. picta Reeve, 1850: valid.
O. sandwicensis Pease, 1860: subjective junior synonym of *O. nitidula* Duclos, 1835.
O. sandwichensis Pease (auct.): misspelling for *O. sandwicensis* Pease, 1860.
O. sandwichiensis Pease (auct.): misspelling for *O. sandwicensis* Pease, 1860.
O. sairoosa Kilburn (auct.): misspelling for *O. sairousa* Kilburn, 1980.
O. sairousa Kilburn, 1980: subjective junior synonym of *O. emeliodina* Duclos, 1845.
O. thomasi Crosse, 1861: subjective junior synonym of *O. nitidula* Duclos, 1835.

REFERENCES.

ABBOTT, R.T. 1974. *American Seashells*. Van Nostrand, N.Y.

BRIDGMAN, F.G. 1909. Description of a new species of *Oliva*. *Proc. Malac. Soc. London* 8(4): 203.

BURCH, J.Q. & R.L. BURCH 1960. *Catalog of recent and fossil Olives*. Minutes of the Conchological Club of Southern California 196: 1-46.

BURCH, J.Q. & R.L. BURCH 1967. The family Olividae. *Pac. Sci.* 21(4): 503-522.

CROSSE, H. 1861. Description d'espèces nouvelles. *Jour. de Conch.* 9: 171-173.

DESHAYES, G.P. & H. MILNE EDWARDS 1844. *Histoire naturelle des animaux sans vertèbres ... par J.B.P.A. de Lamarck*. Baillière, Paris.

DUCLOS, P.L. 1835, 1840. *Histoire naturelle générale et particulière de tous les genres de coquilles univalves marines à l'état vivant et fossile*, publiée par monographies. Genre Olive. Paris.

DUCLOS, P.L. 1844-48. *Oliva* in J.C. CHENU, *Illustrations Conchyliologiques, ou description et figures de toutes les coquilles connues, vivantes et fossiles*. 4 vols. 85 livraisons. Paris.

DUCROS de SAINT GERMAIN, A.M.P. 1857. *Revue critique du Genre* Oliva *de Bruguière*. Fernand Thibaud. Clermont.

FISCHER von WALDHEIM, G. 1807. *Museum Demidoff ou Catalogue systématique et raisonné des Curiosités de la Nature et de l'Art*, donnés à l'Université Impériale de Moscou par Son Excellence Monsieur Paul de Demidoff. Tome Troisième: Végétaux et Animaux. Moscow.

FORD, W.K. 1953. Notes by J.R. le B. Tomlin, M.A. on the Marrat's species of *Oliva*. *The North Western Naturalist* 24: 442-449.

GMELIN, J.F. 1791. *Caroli a Linné systema naturae per regna tria naturae*. Editio decima teria, auctata, reformata. Vol. 1, pers. 6. Vermes: 3021-3910. Leipzig.

GREIFENEDER, D., R. DUCHAMPS & B. TURSCH 1995. Studies on Olividae. XXIII. The Lamarckian names for *Oliva* species. *Apex* 10(2/3): 39-60.

JAY, J.C. 1850. *A catalogue of the shells ... contained in the collection of J. C. Jay*. 4th edition, Craighead, New York.

KAICHER, S.D. 1989. Card catalogue of world wide shells. Pack 54. Olividae part IV. St. Petersburg, Florida.

KAY, A. 1965. Marine molluscs in the Cuming collection, British Museum (Natural History) described by William Harper Pease. *Bull. B. M. (N.H.) Zool. suppl.* 1: 25, pl. 3, figs. 9, 10.

KILBURN, R.N. 1980. The genus *Oliva* in Southern Africa and Mozambique. *Ann. Natal Mus.* 24(1): 221-231.

MARRAT, F.P. 1870-71. *Oliva* Bruguières. In G.B. SOWERBY, *Thesaurus Conchyliorum*.

PEASE, W.H. 1860. Descriptions of new species of Mollusca from the Sandwich Islands. *Proc. Zool. Soc. London* 28: 145.

PETUCH, E.J. & D.M. SARGENT 1986. *Atlas of the living olive shells of the world*. CERF Editions, Charlottesville, VA.

REEVE, L. 1850. *Conchologia iconica or illustrations of the shells of molluscous animals*. Monograph of the genus *Oliva*, pls. 1-30, London.

SCHEPMAN, M.M. 1904. Descriptions of three new species of *Oliva* from the Siboga expedition. *Tijd. Nederl. Dierk. Vereen.*5: 67-69.

TURSCH, B. 1994. Studies on Olividae XXI. The scale of sympatry in the genus *Oliva*. *Apex* 9(4): 131-142.

TURSCH, B. 1995. Micro-endemism, allotopy and taxonomy in the genus *Oliva*. *Abstr. 12th Intl. Malac. Congr.*, Vigo: 107-109.

TURSCH, B. & D. GREIFENEDER 1989a. Studies on Olividae. X. The taxonomic status of *Oliva esiodina* Duclos, 1844, *O. duclosi* Reeve, 1850 and *O. lentiginosa* Reeve, 1850. *Apex* 4(4): 57-68.

TURSCH, B. & D. GREIFENEDER 1989b. Studies on Olividae. XI. *Oliva chrysoplecta* sp. n., a familiar, undescribed Western Pacific species. *Apex* 4(4): 69-84.

TURSCH, B. & Y. MACHBAETE 1995. The microstructure of the shell in the genus *Oliva*. (Studies on Olividae. 24). *Apex* 10(2/3): 61-78.

TURSCH, B. & D. GREIFENEDER 1996. The "*Oliva miniacea* complex", with the description of a familiar, unnamed species. (Studies on Olividae. 25). *Apex* 11(1): 1-49.

TURSCH, B., O. MISSA & J. BOUILLON 1992. Studies on Olividae XIV. The taxonomic structure of *Oliva oliva* (auct.). *Apex* 7(1): 3-22.

VAN OSSELAER, C., J. BOUILLON, J.M. OUIN & B. TURSCH. 1993. Studies on Olividae XVIII. The distribution of *Oliva* species and the variation of their colour patterns in Hansa Bay (Papua New Guinea). *Apex* 9(2/3): 29-46.

WAGNER, R.J.L. & R.T. ABBOTT 1967. *Standard Catalog of Shells*. 2nd. edition. American Malacologists Inc., Greenville, Delaware.

ZEIGLER, R.F. & H.C. PORRECA 1969. *Olive shells of the world*. Rochester Polychrome Press, Rochester, N.Y.

Plate 1 (opposite).

Scale bars: 10 mm.

1. *Oliva caldania* Duclos, 1835: illustrations Pl. 6, figs. 3, 4.

2. ***Oliva brettinghami*** Bridgman, 1909. Holotype (H: 18.2 mm; D: 8.3 mm), "N.W. Australia" BM(NH).
3. *Oliva caldania queenslandica* Petuch & Sargent, 1986. Holotype (H: 12.72 mm; D: 5.82 mm), trawled from 50 m off Cape Moreton, Queensland, AMS C.153539.

4. ***Oliva picta*** Reeve, 1850. One (H: 15.6 mm; D: 8.4 mm) of three syntypes, "Philippine Islands, H. CUMING colln.", BM(NH).
5. *Oliva ceramensis* Schepman, 1904. Syntype (H: 14.2 mm; D: 7.8 mm), from deep water off Ceram Island, Indonesia, ZMA 3.11.104.
6. *Oliva insecta* Petuch & Sargent, 1986. Holotype (H: 12.32 mm; D: 6.57 mm), trawled in 100 m, Davao Bay, Mindanao, Philippines, USNM 841437.

7. ***Oliva emeliodina*** Duclos, 1845. Figured syntype (H: 33.1 mm; D: 15.5 mm), "*Habite la Cochinchine*", MNHN.
8. *Oliva sairousa* Kilburn, 1980. Holotype (H: 33.61 mm; D: 16.82 mm), "Bahia das Cocos, Jangamo dist., Mozambique", NMSA 59937/T2279.

Plate 1

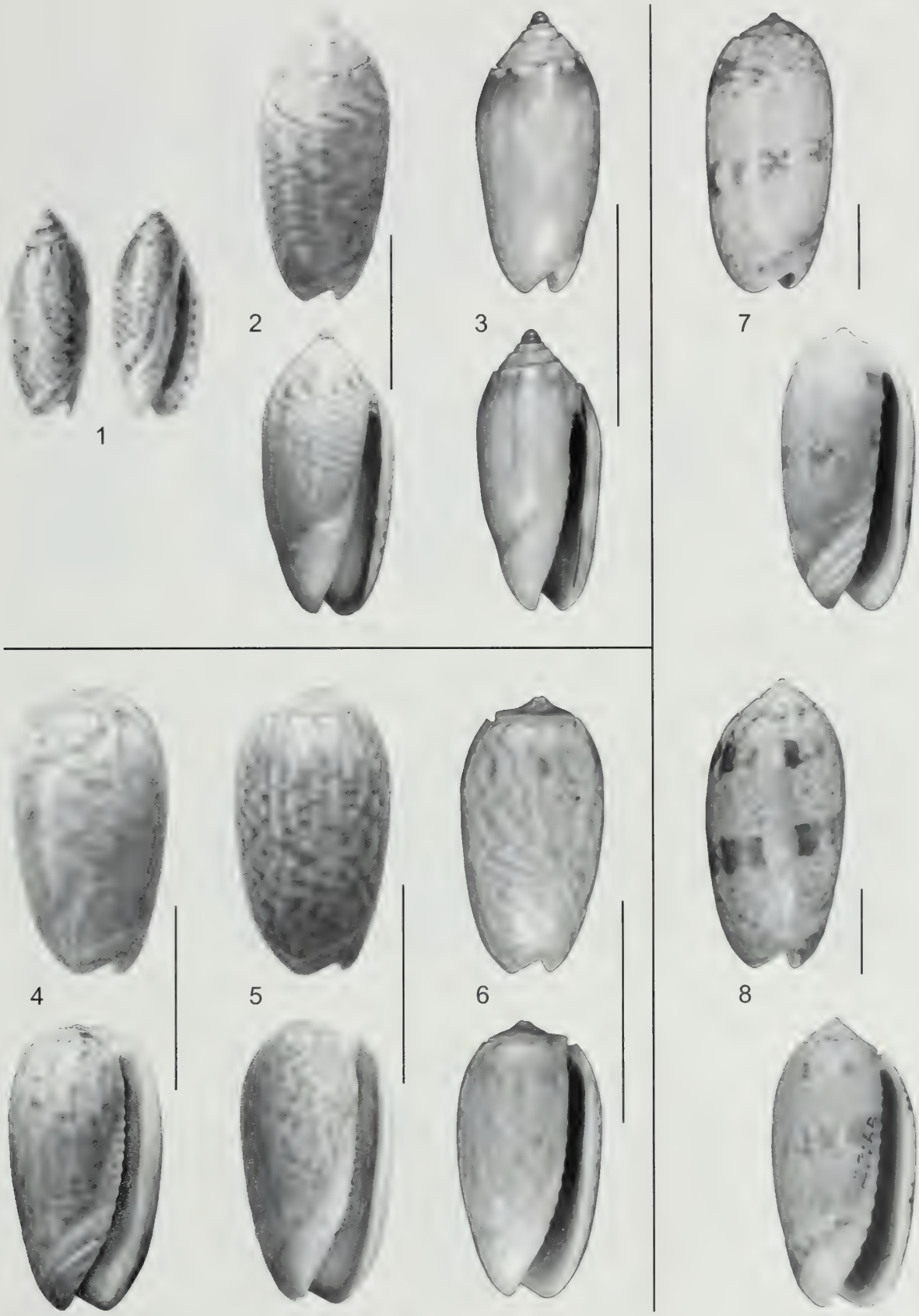


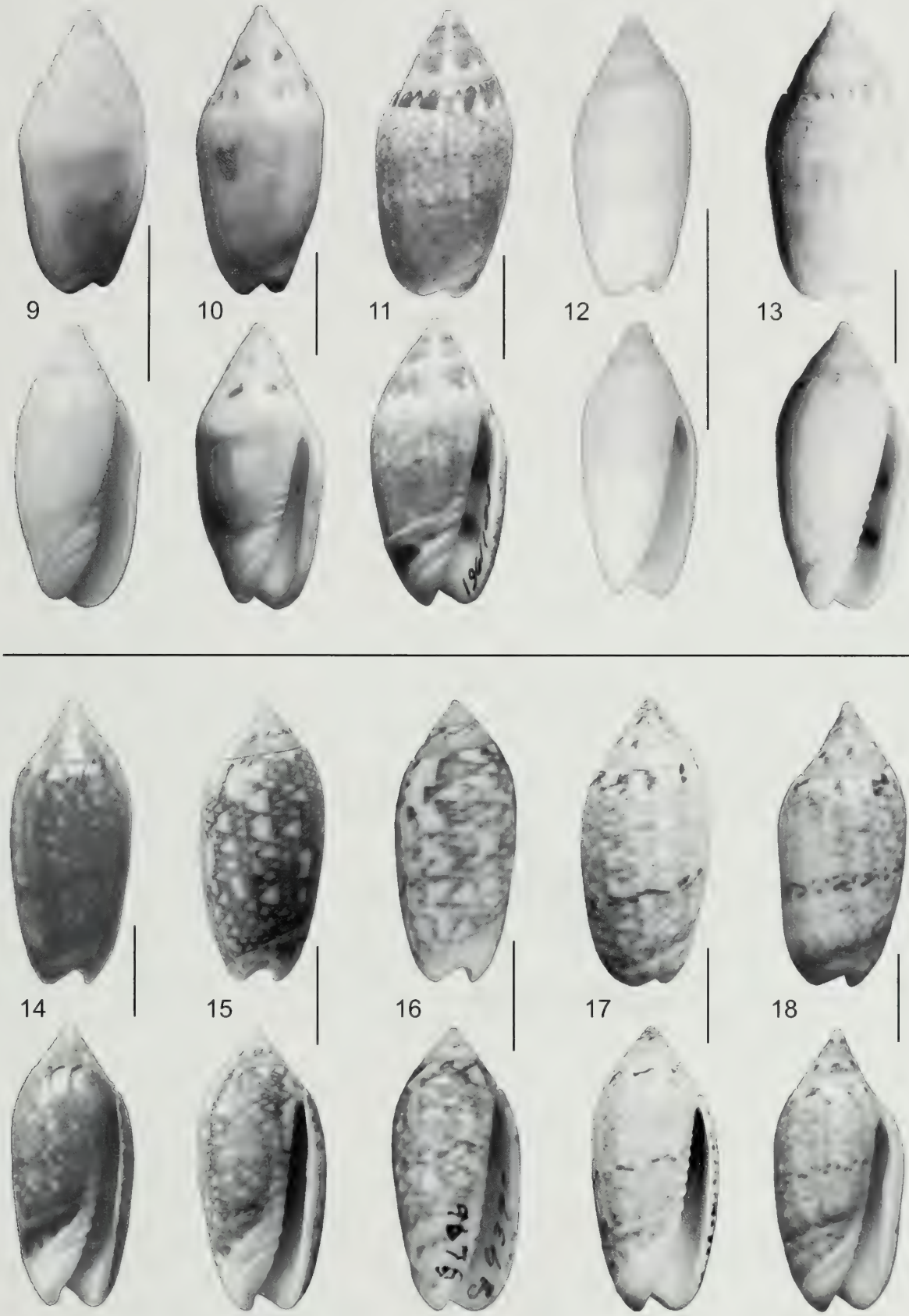
Plate 2 (opposite).

Scale bars: 10 mm.

9. ***Oliva nitidula*** Duclos, 1835. Figured syntype (H: 19 mm; D: 11 mm), no locality, MNHN.
10. *Oliva paxillus* Reeve, 1850. Holotype (H: 27.2 mm; D: 12.2 mm) with label "Holotype H. CUMING colln. Loc.:? "Mauritius" added to the board later ...", BM(NH).
11. *Oliva sandwicensis* Pease, 1860. Lectotype (H: 27.2 mm; D: 13.0 mm) "H. CUMING colln: Sandwich Islands", BM(NH).
12. *Oliva thomasi* Crosse, 1861. Holotype (H: 26.8 mm; D:11.4 mm), "*Habitat in insula Taïti dicta*.", BM(NH).
13. *Oliva leonardi* Petuch & Sargent, 1986. Holotype (H: 12.90 mm; D: 5.51 mm), off Durban, South Africa, USNM 841461.

14. ***Oliva jaspidea*** Duclos, 1835. One (H: 19.4 mm; D: 8.2 mm) of five syntypes, "*Habite La Nouvelle Hollande et Otahiti, d'après Mr. Cuming*", MNHN.
15. *Oliva duclosi* Reeve, 1850. One (H: 28.9 mm; D: 13.3 mm) of three syntypes, "H. CUMING colln. Philippine Islands (Isle of Luzon) + Society Islands", BM(NH) 1987006.
16. *Oliva duclosiana* Jay, 1850. One (H: 26.00; D: 12.05 mm) of two specimens in the Jay collection, no locality, AMNH 89390.
17. *Oliva lentiginosa* Reeve, 1850. One (H: 30.3 mm; D: 13.4 mm) of two syntypes, no locality, Steere collection, BM(NH) 1892.2.24.2-4.
18. *Oliva esiodina* Duclos, 1845. Figured syntype (H: 32.2 mm; D: 14.7 mm), "*Habite La Nouvelle Guinée*", MNHN.

Plate 2



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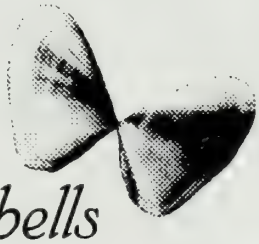

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